Vol. 6 No. 3

March, 1931

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U. S. Department of Agriculture
Bureau of Plant Industry
Western Office of Blister Rust Control
Spokane, Washington

WHAT CREW SIZE?

M. C. Riley

During the winter a series of meetings was held in the Spokane Office to discuss any pressing experimental problems. Among the many good points discussed was the one of proper crew size. Generally speaking, the 3-man crew has been in use during the last two years at least and was also quite extensively used in 1928 and to a lesser extent prior to 1928. It appeared to be the concensus of opinion among the eradication men in the Spokane Office that the 3-man crew was the best. Insufficient figures were available to prove this point, however, so it was decided to work up all material at hand that would shed any light on the subject. Some material had been previously worked up and was reported on in the January 1927 News Letter. Before the data upon which this discussion is based were finally compiled, it was observed that Goodding, according to his 1930 annual report, contemplated using a 6-man crew at Wind River Nursery this coming season. It was also noticed that Johnson, according to his 1930 annual report, used four men in line with one man behind checking all the ground covered. It is understood that the 5-man crew with the foreman checking behind is in general use in the East. Men engaged in actual Ribes eradication work in the West favor a 3-man crew because it is more efficient and requires fewer man-days per acre than other crews. By 3-man crew is meant three men working in line, the foreman usually being in the center.

In compiling the data which follow, the crew foreman sheets were used for all camps for the years 1927 to 1930, inclusive. These sheets show the number of men in the crew, the time spent each day in each eradication type encountered, and the total Ribes pulled in that eradication type. Thus it was possible to get the number of man-days for each size of crew in each eradication type and by various Ribes per acre classes. Unless a crew foreman has had some particular training in estimating acreage it is very difficult to get a correct acreage figure on an area when only the foreman's figures are considered. In all eradication types except stream type, the acreage figures used in any reports have been adjusted to meet the actual acreage as shown by accurate surveys.

In the following tables the 3-man crew has the foreman working in line in all cases. The other crews may have the foreman either in line or behind the line, depending on the method in use during that particular time. Stream type figures represent work done in all four years 1927-1930, inclusive. Work in other types was done in 1927 and 1928. Due to the extremely small amount of data available the 7-man crew was not included. It is felt that this crew is too unwieldly for practical use.

Checking data show that work done in late years with the foreman working in line is just as efficient, if not more so, than that done with a larger crew and the foreman checking behind the line.

The following tables show man-days per acre for various eradication types, crew sizes and Ribes per acre classes:

Number Ribes Per Acre	Stream Types Man-Days Per Acre					Cut-Over Man-Days Per Acre				
	2-Man Crew	3-Man Crew	4-Man Crew	5-Man Crew	6-Man Crew	2-Man Crew	3-Man Crew	4-Man Crew	5-Man Crew	6-Man Crew
0-20	0.125	0.245	0.376	0.237				0.055	**	0.283*
21-40	0.221	0.315	0.435	0.311	**		0.089*	0.152*	0.426*	0.474*
41-60	0.307*	0.317	0.379	0.430			0.132*	0.150*	0.327*	0.289*
61-80	0.231*	0.374	0.448	0.552					0.354	0.429*
81-100	0.270*	0.423	0.477	0.468	0.690		0.205		0.603	0.531
101-150	0.408	0.498	0.595	0.714	0.628		0.284	0.216	0.721	0.551
151-200	0.486*	0.586	0.618	0.752	1.095			0.336	0.745	0.923*
201-300	0.663	0.693	1.936	1.193	1.165		0.371	0.505	0.652	0.878
301-400	0.909	0.866	1.034	1.428	1.627		0.543	0.511	0.733	1.053
401-500	1.075*	1.033	1.150	1.542	2.308		0.541*	0.771	0.902	1.189
501-750	1.028	1.279	1.345	2.146	2.257		0.855	0.906	1.250	1.094
751-1000	1.457	1.705	1.809	3.508	3.151		1.102	1.440	1.285	1.647*
1001-1500	2.118	2.250	2.639	3.495	4.827		1.380*	1.521	1.846	1.684
1501-2000	2.581*	2.767	3.581	3.082	4.347		**	2.667*	2.087*	2.414
2001-3000		3.913	4.311	4.452	5.481					
3001-Up	**	6.034	6.667*	6.167	10.714					

Basis for stream type computations about 7,080 man-days.
Basis for cut-over type computations about 1,805 man-days.

Number Ribes Per Acre	Open Reproduction Man-Days Per Acre					Dense Reproduction Man-Days Per Acre				
	2-Man Crew	3-Man Crew	4-Man Crew	5-Man Crew	6-Man Crew	2-Man Crew	3-Man Crew	4-Man Crew	5-Man Crew	6-Man Crew
0-20			**				0.141*	0.084	0.150	
21-40			0.105*	0.281*			0.151*	0.215	0.231	
41-60		**	0.469*	**			0.208	0.263*	**	
61-80		**	0.408*	0.682*			0.261	**	**	
81-100			0.185	0.969*	**		**	0.367*		
101-150		0.800*	0.585	0.547*	0.813		0.470*	**	**	
151-200		0.682*	0.505*	0.742	1.099		0.869*	**	1.043*	
201-300		0.688*	0.893*	0.901*	1.024	**	1.000*	0.522*		
301-400		0.874	1.638*	0.509	1.099		**	**	**	
401-500		1.304	1.617	1.500*	1.882*		0.514*	0.514*		
501-750		1.333*	1.471	2.150	2.045	**	1.700*	1.818*		
751-1000		**	2.170*	3.312	2.105			2.500*		
1001-1500		2.188*	3.077*	3.125*	4.346*					
1501-2000		**		4.348*	6.000*		**			
2001-3000				6.250*	6.000*					
3001-Up				5.000*						

Basis for open reproduction computations about 680 man-days.
Basis for dense reproduction computations about 388 man-days.

**Designates points where the basis was less than 5 man-days total for all years and hence was not included.
*Basis for these figures is between 5-15 man-days total for all years.

Number Ribes Per Acre	Open Pole Man-Days Per Acre					Dense Pole Man-Days Per Acre				
	2-Man Crew	3-Man Crew	4-Man Crew	5-Man Crew	6-Man Crew	2-Man Crew	3-Man Crew	4-Man Crew	5-Man Crew	6-Man Crew
0-20		0.062	0.046	0.091*	**	**	0.032*	0.056	0.135	0.118*
21-40	**	0.215	0.112*	0.241			**	0.108	0.094*	**
41-60	**	0.128	0.144*	**	**		**	0.235	0.393*	
61-80		0.156	**	0.769*	**		**	0.296*	0.206*	**
81-100	**	0.203*	**	**	**			**	**	
101-150	**	0.231	0.159*	0.692*	1.117		0.295*	0.877*	0.417*	1.500*
151-200	**	0.629	0.340*	**			0.410*	**	**	**
201-300	**	0.441	0.540	**	1.276*		0.484*	**	**	
301-400		0.473		1.293*				**	**	**
401-500		0.608*	0.479	0.718*	1.225*		**	**		**
501-750		0.765	0.520	1.583*	**			**	2.000*	
751-1000			1.235*	1.538*				**		
1001-1500		**	1.368*	1.744*						**
1501-2000		1.156*	1.758		4.467*					
2001-3000		**	2.000*	2.500*						
3001-Up										

Basis for open pole computations about 623 man-days.
Basis for dense pole computations about 267 man-days.

Number Ribes Per Acre	Open Mature Man-Days Per Acre					Dense Mature Man-Days Per Acre				
	2-Man Crew	3-Man Crew	4-Man Crew	5-Man Crew	6-Man Crew	2-Man Crew	3-Man Crew	4-Man Crew	5-Man Crew	6-Man Crew
0-20		0.044	0.082	0.080*			0.078	0.071	0.085	0.313
21-40		**	0.144	0.175*	0.133		0.145	0.112	0.202	0.228
41-60		0.175*	0.220	**	0.075	**	0.119	0.250	0.260	0.260*
61-80		0.259*	0.358*	0.456*			0.327	0.267	0.290	0.319
81-100		0.273*	0.439*	**			0.140	0.376	0.348	0.454
101-150		0.380*	0.246*	**	2.300	**	0.300	0.384	0.416	0.736*
151-200		**	0.500*			**	0.400	0.613	0.603	0.652*
201-300		0.664*	**	**			0.655	0.770	1.025	1.792*
301-400			**			**	0.725	0.774	1.343	0.647*
401-500		**					0.740	0.750*	0.900	0.700*
501-750		**	**	0.480*		**	1.102	0.804	0.473	2.304*

Basis for open mature computations about 1,807 man-days.
Basis for dense mature computations about 356 man-days.

**Designates points where the basis was less than 5 man-days total for all years and hence was not included.
*Basis for these figures is between 5-15 man-days total for all years.

Discussion of Tables

Stream type. In stream type a 2-man crew is used only in dry draws where the prevailing Ribes species necessitates its being called stream type.

and along small streams where Ribes are not in dense masses but occur in a very narrow fringe along the stream. A 2-man crew does not lay string line. This may partially account for the advantage of a 2-man crew over a 3-man crew.

In all cases the 3-man crew requires fewer man-days per acre than the 4-man crew. In general the 4-man crew shows better results than the 5-man, and the 5-man crew shows better results than the 6-man. Here are data representing about 7,080 man-days of work. It shows beyond all question of doubt that on stream type smaller crews get more work done per man than the larger ones. Could anything be more convincing that Ribes eradication supervisors were right when they adopted the smaller size of crew?

Cut-over. The figures for this type support the same conclusions as was the case in stream type.

Open reproduction. The results for this type are in general the same as for the stream and cut-over types. However, the tendency is not so marked here because there are more weak points.

Dense reproduction. There are so many weak points in this table that it is impossible to draw any definite conclusions. However, a comparison of the two strong points in both the 4-man and 5-man crews shows the 4-man crew superior.

Open pole. Most of the points on the 5 and 6-man crews are weak but this is at least partially offset by the frequency of the points. The 4-man crew probably has the advantage over the 3-man crew but the fact remains that smaller crews have the advantage over larger ones in open pole types.

Dense pole. This type has been encountered less frequently than any other type and this will probably be the case in the future. Figures available to date are too few to form the basis for any real comparisons.

Open mature. In this table the frequency is low and the majority of the points are weak but the tendency here is toward smaller crews.

Dense mature. There is no mistaking the trend here because in general the smaller crew has the advantage over the next larger crew.

It is apparent from the tables that a 3-man or 4-man crew is the most practical in all eradication types with the exception of stream type in dry draws and on small creeks where bushes are easily pulled and are scattered or in a narrow fringe along the stream.

The eradication methods report by H. E. Swanson in the 1928 annual report also brought out such points as follow: the 3-man crew appears to be the most practical from the standpoint of both cost and efficiency; a 3-man crew takes as wide a strip as a 4-man crew; in the 4-man crew when two men are required to pull a bush the other two men are inclined to visit and shirk rather than to assist but in the 3-man crew under the same conditions the third man

has nothing to do but work. The same report brings out the fact that one man can check at least 4 crew-days work in the heavier Ribes classes in a day of either the 3 or 4-man crew. This means a considerable saving over having a foreman behind the line in each crew. There is also a pronounced psychological advantage in having the foreman in line rather than checking behind the men in a modified "slave driver" fashion and the foreman is in a position to better observe the work of the men. The time required per acre increases as the size of the crew increases. The waiting factor on the part of the men in the larger crews, together with the bulkiness of such crews accounts for the increase in time.

No great emphasis should be laid upon the fact that there are several instances in which the data are out of line from the general relation existing between different sizes of crews. These inconsistencies are inevitable because of the nature of the data. However, the large mass of data used is sufficient upon which to base final recommendations as to crew size.

In the north Idaho territory it is not feasible to make any type distinctions in reference to working blocks with the exception of stream type. In other words, a crew may encounter at least two eradication types in the same day. Hence we must use the crew most generally suited to all types and that is the 3-man crew.

BLISTER RUST STARTS FRUITING EARLY

The earliest known fruiting of white pine blister rust on the Pacific Coast was noted on the Paschall Ranch infection area near Bremerton, Washington, March 1, 1931 by S. Edward Paschall on three or more pines. Mr. Paschall keeps a close check on blister rust activities in the vicinity of Bremerton and furnishes this office with all information obtained. The last few years an annual supply of blister rust specimens has been collected near Bremerton.

In 1930 the first aecia appeared on March 16 which was the earliest fruiting noted up to that time. In 1928 the first aecia appeared March 19 and in 1929 the opening day was April 7.

The past winter has been extremely open on the Coast. No really cold weather has been experienced and it might be said that good spring weather has prevailed since last fall. Undoubtedly these weather conditions have been largely responsible for the early aecia production.

The Newman Lake infection plot near Spokane has not yet been inspected but snow is still covering that area so it is unlikely that any activity will be noted there for several weeks at least.

Homer Hartman returned to the Spokane Office March 12 after spending a month at Corvallis, Oregon.

RELATIVE HUMIDITY AN IMPORTANT FACTOR IN INFECTION OF PINES

H. N. Putnam

There are many factors influencing the degree of severity with which pines are attacked by blister rust. Such factors as amount and species of Ribes, size and abundance of white pines and distance of Ribes to white pines can be expressed quantitatively with relatively little difficulty. Another group of factors, the environmental factors, of which relative humidity is a very important one, are very difficult to express quantitatively.

That the relative humidity factor is highly important in spreading the rust is recognized by all of us. We know that a summer and early fall of frequent rains and high relative humidity is usually a reason of few forest fires but of much rust activity and infection of pines. While all this is common, general knowledge, we need to know something more specific, more quantitative, in order to use our common knowledge. For example, we would find it useful to know what might be expected in rust development under certain relative humidity conditions, other things being equal. Such well substantiated knowledge would enable us to predict the action of the rust in a given drainage with much more accuracy and assurance after determining the relative humidity factor than before making such determination. This type of information might conceivably be of value in fixing the width of protective zones predicting the damage and determining the order in which areas should be protected.

In choosing a quantitative unit to express relative humidity, it was decided that the time element, the length of time given relative humidity per cents obtained, was important. Accordingly, from hygrothermograph weekly records the number of hours during which the relative humidity per cents were in ten per cent limits were scaled off. In other words, there was compiled the total number of hours when the relative humidity per cent was between 20 and 29%, 30 and 39%, etc.

These groupings of hours of stated relative humidites were classified under three infection periods as follows:

(1) Aecial infection - April 15, when early records were available, to June 15.
(2) Uredinial intensification - June 16 to July 31.
(3) Infection of pines - August 1 to October 15, when late records were available.

Arbitrarily two divisions of the relative humidity hours were made: (1) 60% or more relative humidity constituted moisture conditions favorable for rust development, and (2) 90% or more represented optimum conditions for such development. There are two ways in which relative humidity conditions may be shown with reference to blister rust activities. These are (1) chronologically, and (2) geographically. It is beyond the scope of this

short article to present graphically or at any length correlation data along these two lines. Only brief mention will be made of some of the indications.

We know from canker analysis at several infection points that the season of 1927 was favorable for the production of cankers. What were the relative humidity conditions in 1927 as compared with other years? In Table No. 1 is shown the comparative lengths of time of favorable relative humidities during the time of infection of pines.

TABLE NO. 1

PER CENT OF TOTAL HOURS OF RELATIVE HUMIDITY 60% OR MORE IN THE PERIOD OF PINE INFECTION AUGUST 1 TO SEPTEMBER 30 BY AREAS AND YEARS

Area	1926 Per Cent	1927 Per Cent	1928 Per Cent	1929 Per Cent	1930 Per Cent	Average Per Cent
Bovill, Idaho	58	67	59	58	60	60
Elk River, Idaho	62	68	51	57	62	60
Oak Grove Ranger Station, Oregon	70	77	65	63	63	67
Darrington, Wash.	70	81	81	69	71	74
Pysht, Wash.	-	93	97	94	95	95

It may be observed that at the first four named places the period of high relative humidity was the longest in 1927, except at Darrington, Washington, where it was equalled in 1928. At Pysht, on the other hand, the period of relative humidity above 60% was shortest in 1927, but the number of hours of high relative humidity at Pysht was very great each year.

In Table No. 1 is also brought out the fact that the three last named places on the Coast had longer periods of high relative humidity than obtained at Bovill and Elk River, Idaho.

Much can be done in correlating infection data with relative humidity. This article is intended merely as indicating one treatment of the problem. There are other methods. For example, it may very well be true that the significance of high relative humidity is not so much in the number of hours as in the number of continuous hours. It may well be that a period of 48 hours of relative humidity over 90% will accomplish much more in aiding pine infection than many times that number of hours divided by periods of low relative humidity. This whole subject is most interesting and the field is not crowded.

B. A. Anderson and H. E. Swanson made a business trip to Moscow, Idaho and Pullman, Washington March 6 and 7 to interview prospective employees.

PLANT STEM INJECTIONS

John F. Breakey

It is common knowledge among persons familiar with white pine blister rust control and the killing of Ribes by applying chemical sprays, that the plant absorption of the toxic compounds through the leaves and stems is a most uncertain and many times almost unexplainable process. Factors affecting the process are temperature, relative humidity, season, time of day, presence of dew, rains, spreaders, percentage of chemical in solution, reaction of water used in chemical solutions, and Ribes species. The process is made still more complex by the combination in each instance of several of the variable factors just enumerated.

Faced with the inconsistencies in the action of chemical sprays as killing agents, a constant lookout has been maintained in an effort to find some means of effectually applying a killing agent to Ribes which is always positive in its reaction on the plants.

Ribes were killed last season on experimental plots at Santa, Idaho by injecting beneath the cambium ring of the plants, at an accessible point above the crowns, a small quantity of a toxic chemical in the form of a paste.

This discovery has been viewed with much favor because it is positive in application and a very small amount of chemical is required to effect a kill. However, it is necessary to find a means of keeping the chemical to be used (salts of heavy metals, chlorates, etc.) in a paste form during the period of applications, and to devise adequate apparatus for effective and high speed treatment of Ribes on a large scale basis.

As experimental time is limited because of the presence of the white pine blister rust and a lack of similar apparatus to aid us in our choice of ideas, four lines of thought are being followed in developing distinct types of equipment to be used as stem injectors. These ideas have been supplied by members of the Office of Blister Rust Control who are familiar with the development of the chemical eradication program up to its present status, and the associated evolution of adequate equipment with which to effectually perform the field work.

Plant stem injector No. I consists of a small pressure tank filled with chemical paste, and a tool resembling a pair of heavy pliers connected to the pressure tank by a small hose. The paste feeds through the upper jaw of the pliers to a wedge shaped hollow knife mounted in place of the regular jaw. An automatic valve controls the flow of the paste. The wedge shaped knife is forced into the stem just as a bolt would be grasped by an ordinary pair of pliers. A model of this injector is nearing completion at a local machine shop.

Plant stem injector No. II has one jaw and a wedge shaped hollow injector knife and is operated by a lever action similar to No. I,

but differs from it in that the supply of paste is contained in a hollow tube which is made a part of one of the handles. The paste is forced out into the stem by means of a screw operating on a leather plunger, similar to a common grease gun.

Plant stem injector No. III is a cylindrical tool with a hook on the posterior end. It has a fast traveling screw which operates the injector. The paste is fed into the stem from a tube forming the body of the tool, the force being applied by a small lever.

Plant stem injector No. IV has a central tube incasing the working parts, a double hook or claw on the posterior end, and is attached to a hose on the anterior end. A clamp is attached to the posterior claw to hold the stem in place while the knife is being driven through the stem by a separate lever. A valve controls the flow of paste from a separate pressure tank. The tank and tool are connected by a small hose. This injector has no automatic devices, all action being positive and subject to the will of the operator.

Preliminary drawings have been completed for three of these injectors, Nos. I and IV being now under construction. No. I will be tried out as soon as completed to indicate errors, if any, in present calculations and designs.

ATTEND INVESTIGATIVE MEETING

W. V. Benedict attended the Region 5 annual investigative meeting held at San Francisco, California, March 2, 3 and 4 and reported upon blister rust control activities in California.

George Root, California state leader, also attended the meeting.

RATING OF THE AUTHORS

One of the old customs in this office is the yearly tabulating of news letter articles according to authors. In order that 1930 may be entirely normal that work has been done.

The rating for 1930 has been figured according to "page inches" and the method of measuring gave credit only for the space actually covered, the upper and lower margins on each page being disregarded. No attempt was made to give credit to each temporary employee but each of the permanent employees of the office who contributed is listed. Twenty-eight contributors are listed counting all temporary employees as one. If each had shared an equal part of the writing burden he would have contributed 33.758 page inches. The double line across the table is the average line. If you find your name above that line you are above the average in News Letter contributions but if you are

below you should start bombarding the editor with material the news-hungry public is craving.

Name	Page Inches	Per Cent of Yearly Total
Miller, Kermit	129	13.64
All temporary men	121½	12.85
MacLeod, R. L.	63½	6.72
Strong, C. C.	60¼	6.38
Benedict, W. V.	53¾	5.69
Root, George	49¾	5.27
Riley, M. C.	46¼	4.89
Johnson, C. H.	45	4.76
Anderson, B. A.	43½	4.60
Joy, E. L.	43	4.55
Swanson, H. E.	35½	3.76
Guernsey, W. G.	32¾	3.47
Offord, H. R.	30¼	3.20
Wyckoff, S. N.	21½	2.25
Goodding, L. N.	20¾	2.20
Patty, Frank A.	20¼	2.14
Hubert, Dr. E. E.	16	1.69
Mellon, Ethel K.	15	1.59
Miller, D. R.	14½	1.53
Breakey, J. F.	14	1.48
Harris, T. H.	13	1.38
d'Urbal, R. P.	12½	1.32
Myers, R. E.	11	1.16
Glasgow, A. H.	9½	1.00
Geil, H. F.	6¾	0.72
Hartman, Homer	6	0.64
Putnam, H. N.	6	0.64
Chapman, C. M.	4½	0.48
Totals	945¼	100.00

TEMPORARY EMPLOYMENT

B. A. Anderson

Last fall when tentative plans were drawn up for a ten-year blister rust control program, the question was raised, "Will it be possible to secure an adequate number of temporary employees suitable for the work during the field season?" That question can now be answered in the affirmative - for this year. It has never been very difficult to secure a sufficient number of men for the field season and this year has proved no exception.

Applications have poured into the office until at the present time there are almost a thousand on file. At the Spokane Office the

full time of one man is required to interview men, answer correspondence and check on references.

The almost continual stream of men, day in and day out, past the employment desk is a fair indication of the general hard times. Practically every state in the Union is represented in the application files. Almost every applicant is worthy of serious consideration. The largest percentage of these are self-supporting and in a large number of cases are contributing to the support of dependents. Boys as young as fourteen years of age literally beg for flunky work and are supported by letters of recommendation and personal calls of their parents, who state that it is impossible to secure work and the family is dependent on the earnings of their children.

High school boys, college students, migratory workers, woodsmen, women and men from every walk of life are seeking employment in the blister rust camps. Since the beginning of the depression there seems to have been no absorption by any agency of the men who have lost out in the general shake-up and reorganization of industries. Anyone would, indeed, be a hard-hearted individual not to be touched by some of the pleas for work which are filled with struggle, disappointment, and of the utter futility of carrying on.

This year, due to the increased blister rust program, the Office of Blister Rust Control is in a position to alleviate a little of the hardship brought on by unemployment by the use of a larger number of temporary men. The applicants who are finally offered contracts will have been considered primarily as to their fitness and suitability for the position offered them, but also as to their actual need of employment.

Regardless of the amount of time necessary to explain the employment situation to prospective applicants, I believe it is time well spent. Every applicant should leave the office knowing his approximate chances of being placed and feeling satisfied that he has been treated courteously and that he will be given serious consideration. If he cannot be used this year and, if blister rust work increases as it has in the past, there may be a place for him next year. Courteous treatment of all applicants will do much to secure a sufficient number of temporary field employees during an ordinary year. This is an exceptional year, with the labor mart so glutted that we are able to have a better choice of men than we have ever had in the past.

NOTES

Miller Cowling and W. G. Guernsey spent March 5, 6 and 7 taking pictures of winter logging operations on the Three Bear Creek area of the Potlatch Lumber Company near Bovill, Idaho.

C. M. Chapman and George Whiting began quarantine inspection work March 1. Chapman is located at Ogden, Utah, and Whiting is holding forth at Denver, Colorado.

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N E W S L E T T E R

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U. S. Department of Agriculture
Bureau of Plant Industry
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Spokane, Washington

EARLY AECIAL PRODUCTION

The March issue of the News Letter contained an article giving the dates of the first appearance of aecia near Bremerton, Washington, for the last three years. March 1 was the opening date at Paschall's Ranch this year, the earliest date so far recorded for that region. Since that item was written the editor spent 10 days visiting the major infection areas of the Puget Sound region and some rather interesting observations were made.

The three or four small trees which showed aecia March 1 are situated in openings in the timber stand on a south facing slope directly exposed to whatever sunlight was available in that region of abundant spring rainfall. The writer visited the Paschall Ranch infection area the first time March 24 and discovered that the great majority of the blister rust cankers in that area were not fruiting and indications were that very little aecia would be in evidence for two or three weeks.

H. N. Putnam and the writer visited the extensive Columbia Valley infection area near Sumas, Washington, on March 30 and the smaller areas near Abbotsford and Sperling, B. C. on March 31. In all cases aecial production was far advanced and many of the pustules had liberated all of their spores. The infected pines in the areas mentioned were growing on cut-over or burned-over land with no forest canopy above them.

Several areas of heavy infection on the Olympic Peninsula near Port Angeles, Ramapo, Crescent Lake and Spencer Creek were visited and all of them showed that aecia had been produced for some time. Whether aecia was produced earlier on these areas than at Paschall's Ranch is not known for this office has no loyal observer to furnish that information from the other areas as Mr. S. E. Paschall does from his ranch. One thing is certain, it will be around April 15 before the cankers at Paschall's Ranch reach the aecial production stage that the other areas showed on March 30 and 31.

OBSERVATIONS ON RUST PHENOLOGY

H. N. Putnam

A recent trip to western Washington during which many of the known pine infection centers were visited during the period March 29 to April 2, gave opportunity to make observations of the correlation of canker development and Ribes leaf development. Studies made by the Office of Forest Pathology have shown that in the West, Ribes leaves about a third grown are most susceptible to aecial infection. Hence the relationship between the time of aecial dissemination and that of Ribes leafing out is most important. In the following table this

relationship is shown at each of the infection points visited.

CONDITION OF AECIAL DISSEMINATION IN RELATION TO THE LEAFING OUT OF RIBES, WESTERN WASHINGTON, MARCH 29 TO APRIL 2, 1931

	Canker Data			Ribes Data		
Place	Development of Aecia	Probable Year Origin of Infection	Intensity of Infection	Species	Abundance	Growth Condition
Maple Falls Kendall Area. Whatcom County	Blisters broken. Aecia mostly in place.	1919	Infection distributed over 15 sq. mi. Cankers numerous in spots. Cankers fruiting and older most numerous.	R. sanguineum R. lacustre	Scarce Abundant in spots.	Leaves half grown. In full flower. Leaves one-fourth grown Not in flower.
Ramapo Clallam County	Aecia one third to one-half gone.	1919	Many cankers per tree. Mostly 1927 and 1928 origin, producing aecia for 1st or 2nd time. Few juvenile cankers found.	R. divaricatum R. lobbii R. lacustre R. bracteosum	Abundant Abundant Abundant Abundant	Leaves one-fourth grown. Not in flower do do Leaf buds just bursting.
Piedmont Clallam County	Aecia one-fourth gone.	1923	Many cankers per tree. Mostly 1927 and 1928 origin. 1st symptoms & juveniles abundant. Several on 1929 wood. A scarcity of cankers producing aecia, but many cankers having 2nd pycnia.	R. bracteosum R. lacustre	Abundant Medium	Leaf buds just bursting. Leaves one-third grown. Not in flower.
Spencer Creek Jefferson County	Blisters broken. Aecia mostly in place.	1919	Many cankers per tree. Mostly 1927 and 1928 origin. 1st symptoms and juveniles present. Not abundant.	R. bracteosum	Abundant	Leaf buds just bursting.

(continued on next page.)

Place	Canker Data			Ribes Data		
	Development of Aecia	Probable Year Origin of Infection	Intensity of Infection	Species	Abundance	Growth Condition
Duckabush Cr. Jefferson County	Blisters broken. Aecia mostly in place.	1919	Few cankers per tree, and relatively few trees infected. One tree quite heavily infected with cankers of 1923 origin. Few cankers of more recent origin.	R. bracteosum	Medium	Leaf buds just bursting.
Navy Yard Sawmill Kitsap County	Blisters broken. Aecia in place.	1919	Only two cankers seen originating since 1923 Cankers originating in 1919 and 1923 quite abundant near stream. Large branch cankers with infection grown into trunks common. Practically no intensification of infection since 1923.	R. bracteosum	Medium	Leaf buds just bursting.
Paschall Ranch Kitsap County	Blisters broken. Aecia in place. Many cankers show blisters still unbroken.	1919	Many cankers of 1927 and 1928 origin. Several cankers younger than fruiting once. Cankers with blisters formed reported by Mr. Paschall on March 1.	R. bracteosum R. sanguineum	Abundant Medium	Leaf buds burst, and opening out. Leaves one-half grown. In full flower.
Chico Kitsap County	Blisters broken. Aecia in place. Many cankers show blisters still unbroken.	1919	Very few cankers fruiting except those of 1923 origin or earlier. Cankers originating since 1923 are mostly not producing aecia this year.	R. sanguineum	Medium	Leaves one-half grown. Bushes in full bloom.

At the points examined no consistent correlation is apparent between the time of aecial dispersal and leafing out of Ribes. For example at Ramapo the cankers were the most advanced of any infection visited, aecia

being one-third to one-half dispersed from the cankers, while the Ribes showed only bursting leaf buds, or leaves one-third grown. On the other hand, at Chico, and on the Maple Falls-Kendall area, Ribes leaves were one-half grown in size, while there had been no appreciable dispersion of aecia, and many of the blisters had not been broken.

Of all the infections visited there was at Ramapo evidence of the largest number of 1927 and 1928 origin cankers in proportion to older cankers. It is highly possible that the Ribes leaves were in optimum stage of development to take infection at the time of greatest dispersal of aeciospores. While we have no data to support this idea, it furnishes food for interesting speculation.

There is a decided difference in the time of leafing out of the different species of Ribes. R. sanguineum was the most advanced in this respect, and R. bracteosum the least. Since there is apparently a wide variation in the time of aecial dissemination and the time of Ribes leafing out due to local influences, it is evident that the rust in a pine infection associated with several species of Ribes where there is a wide range in the time of leafing out has a better chance of intensifying than in one associated with only one Ribes species, other things being equal.

Two of the pine infections presented unusual conditions. The Maple Falls-Kendall area showed quite abundant and well distributed pine infection with many cankers of 1927 and 1928 origin, and a dearth of Ribes. The Navy Yard Mill infection showed R. bracteosum abundantly associated with pines quite heavily infected with cankers originating in 1923 or earlier, but, unlike every other infection seen, practically no cankers originating since 1923. Normally we would expect very little intensification of the rust at Maple Falls, and much intensification at the Navy Yard Mill infection, conditions opposite to those found. Plans are being made for a detailed study of these two infections this summer.

On April 6 and April 9, visits were made to the Newman Lake infection plot. Blisters had pushed thru the bark, but none of them were seen broken. R. lacustre leaf buds were just opening, and R. inerme leaves were about one-half grown. At Newman Lake there will be a very large volume of aecia this spring. Most of the cankers present will be producing aecia for the first time. A hasty examination of infected trees showed no first symptoms or juvenile cankers. If canker conditions at Newman Lake are representative of conditions in the Inland Empire, and it is believed they are, we may expect an enormous amount of aecia produced in the white pine forests this spring.

EASY TO KILL POISON OAK

G. A. Root

Experiments by E. R. de Ong in the use of carbon bisulphide on poison oak plants have shown that it is possible to kill a large number of th plants with a single application. The second year of the experiments, a few

weak sprouts may appear but these are readily killed with small dosages of the liquid. This work was done in July, 1928, in the Emerald Lake district at Redwood City.

A single application of carbon bisulphide was made on numerous clumps of young and old plants, using two ounces as a dose and spacing these 18 inches apart in holes 12 inches deep. The number of applications varied with the size of the clump treated. If very small, two were found sufficient. When there are a number of small scattered plants close together, the doses should be spaced about 18 inches and alternated in adjoining rows, or as it is sometimes expressed "staggered." The holes are made with a steel prod the dosage measured and poured in through a pipe reaching to the bottom of the hole. After the liquid has soaked into the ground the hole is closed with a clot and tamped tight.

Carbon bisulphide is a heavy, oily-like liquid which evaporates readily and forms a heavy, poisonous gas used in killing ground squirrels and insects as well as plants. The gas is much heavier than air and consequently penetrates into the soil in every direction unless in very dense heavy soil or where soaked with water. The best time for application is in the summer, after the subsoil is getting dry but not in ground that is badly cracked. Soils in the latter condition should be lightly irrigated and treated when the ground is dry enough to cultivate.

Carbon bisulphide may also be used for killing deep rooted weeds, such as morning glory and Russian thistle, as well as shrubs and trees. In computing the comparative costs of chemical treatments and hand grubbing, it must be remembered that the latter process must usually be repeated two to five or six times. One chemical treatment is sufficient for the first year, with the possibility of a light application the second year.

Note: The above article appeared in a recent issue of the California Cultivator. Is there a chance for the application of this gas in Ribes eradication? It would seem that the factor of a water-soaked soil would prevent its use where most needed. There may be other conditions which would inhibit its widespread use in our work. Perhaps Offord has something to say on the subject. G. A. Root

CARBON BISULPHIDE AS A RIBICIDE

H. R. Offord

Our hustling editor has seen fit to prod the chemical department into literary action by selecting a well known herbicide and demanding to know why this chemical is not being used as a Ribicide. The first carrot to be dangled in front of the chemical nose is carbon bisulphide. Very clever sir! I foresee many arguments between us on similar subjects with the resultant production of much copy. Nevertheless, here goes for some apologetics on carbon bisulphide.

Properties and Uses

Carbon bisulphide is a colorless, highly volatile liquid, the vapors of which are so violently explosive when mixed with air that they

may be readily ignited by a hot wire. The fumes of carbon bisulphide are extremely poisonous and in addition are very malodorous. Inhaled continuously they produce headache, dizziness, hysterial excitement, feeble pulse and prostration, in the order named. Commercially, the substance is made by passing sulphur vapor over hot carbon in an electric oven. Many industrial processes annually consume large quantities of CS_2 as a solvent; in agriculture it has had considerable use as a rodenticide and a somewhat less extensive use as an herbicide. It has also been employed extensively as a fumigant for stored grains in elevators and bins. In small amounts carbon bisulphide has been used successfully to improve the fertility of soils made "sick" by the continuous culture of the same crop. In Europe it was found that in the treatment of Phylloxera, carbon bisulphide markedly increased the yield of grapes.

Use as a Weed Killer

There is no doubt about the toxicity of CS_2 when applied to the soil about plant roots. Among the plants reported by various investigators as having been killed by CS_2 might be noted poison oak, barberry, camel's thorn, sassafras, wild onion, Canada thistle, guava lantana, and prickly pear. The usual method of application is to sink holes in the soil with a crow bar and pour about two ounces of bisulphide in each hole. Owing to considerable downward diffusion through most types of soils, carbon bisulphide is particularly effective on deep rooted perennials. The final effectiveness, however, varies a great deal with different types of soils and with the per cent of moisture in those soils. Like all substances which are used as soil poisons the quantity of CS_2 used per acre is very large and at a price of 8 cents per pound it can be used only on the most valuable of agricultural lands.

Disadvantages for Ribes Eradication

A weed killer in liquid form is unsatisfactory even at best for Ribes eradication work. If extreme inflammability, disagreeable odor, and toxicity to operator be added to its list of sins the case of bilsuphide begins to get desperate. When at the same time, the cost of applying it does not seem particularly inviting the jury has felt justified in passing a verdict of "guilty on circumstantial evidence". We are no longer interested in chemicals merely because they kill Ribes - they must do it cheaply and safely.

HIGH GROWING RIBES

B. A. Ganoung

California isn't the only place where Ribes grow in trees. Washington has them too, but instead of one bush in a redwood and one in an oak, all three are on a maple.

During a recent round of golf at the Maple Grove golf course near Renton, Washington, I observed three vigorous Ribes divaricatum bushes growing in the moss on the trunk of a maple tree (Acer macrophyllum). One bush was about eight feet above the ground, one about twelve feet and the

other about fifteen feet. Each bush consisted of five to fifteen stems, all in leaf, and apparently in a very healthy condition.

No investigation was made to determine whether or not the roots entered the bark but it was assumed that they did not. The trunk of the maple was covered with several inches of moss, ample to provide a foothold for the bushes. The tree is situated near Cedar River and moisture is abundant. The bushes appeared to be two or three years old.

Editor's Note: Ganoung apparently refers to two articles by G. A. Root which appeared in the News Letter. The first appeared in the September 1928 issue under the title of "Currant Bush Supported on High" and the other in the December 1929 issue titled "Oddities of Nature in Yosemite". California is still one up because Root's bush is 80 feet above the ground while Ganoung's is only a meager 15.

THE FEDERAL ASPECT OF RADIO IN THE EDUCATIONAL FIELD

G. A. Root

Since 1925, the U. S. Department of Agriculture has used the radio for educational programs. Prior to that, weather reports and market news were the only features broadcast. At the present time 50% of the 600 radio stations in the United States cooperate daily with the Department. Some broadcast only reports and market news but 200 carry the daily educational programs.

The National Broadcasting Company has put at the Department's disposal, five days a week for educational work. A chain of 39 stations in the East is "hooked up" for broadcasting. During the latter part of 1930, the company made arrangements for Federal programs through its Pacific Division network. It is known as the Western Home Hour program and is designated to serve rural and urban radio listeners of the Western region. They can be better served than by a network program originating in Washington. Several western states are included in the Pacific network involving seven radio stations. The key station is KGO at San Francisco.

Articles are prepared by various western Government officials on all topics. A tentative program has been arranged for a series of five or six talks on blister rust for 1931. The only means of knowing how well a talk is received or interest manifested, is by letters which the studio may receive.

An article of passing interest occurred in a recent issue of the Official Record entitled, "How Much Sugar Coating Must Educational Radio Talks Have." Some educators insist that for the average radio audience, information should be presented on the "level of 13 year olds". Others question this but realize that a certain amount of "sugar coating" is essential. Just how far this should go is problematical. To draft a blister rust talk on the level of a "13 year old" is beyond the scope of this writer.

The Radio Service is endeavoring to find out through a series of tests just what the audience prefers. Nine different methods of presenting

agricultural information will be tried. The station, cooperating with the Radio Service is WGY of Schenectady, New York. The agricultural broadcasts of this station brought in 13% of the mail although only utilizing 6% of the time.

THE AMATEUR MOVIE IN THE EDUCATIONAL AND INDUSTRIAL FIELD

G. A. Root

The use of an amateur movie camera last summer and the reasonably satisfactory results obtained has led the writer to delve into the subject of the amateur movie.

The small movie camera is an outgrowth of the professional standard size machine. The public interest in movies caused the production of the smaller movie machine which could be used by most anyone with a certain assurance of obtaining good results. There is a fascination of taking motion pictures and watching for results when thrown on the screen. In the beginning, the use of the small camera was of a purely recreational nature, such as is associated with the general use of the still camera. As time went on, and improvements made, it was seen that there was a real place for the small movie in various educational and business activities.

Schools and colleges and other institutions of learning have been quick to grasp the 16 mm. (2/3 in.) movie film as a means of helping in their educational work. Its uses are many and varied. The work of the Princeton University Observatory was shown by a 16 mm. film, the last reel of the series depicting actual photographs of the moon taken through the big Princeton telescope, one of the largest on the Atlantic seaboard. Schools of medicine have found the 16 mm. film of particular aid in depicting certain types of operations. One medical school filmed a dissection, condensing the work of six weeks, the time actually required to complete the dissection to half an hour of screen time.

Civic, scientific and welfare organizations are making use of the small film to help aid their activities in their respective fields. Many agencies are reducing the standard type of film to the 16 mm. size, whereby a larger number of films may be distributed to clubs, schools and like organizations at a reduction in cost and the use of less cumbersome equipment.

Motion pictures to promote industrial efficiency have been used of late. The so-called amateur machine has been found to be the best for this purpose. Designed as a toy, it has turned out to be a potent aid to the industries. For many years in the industrial world, there has been an endeavor to increase efficiency with the attending increase of production. In those fields, where the fabrication of certain commodities requires a repetitive cycle of motions, largely by hand, there is a realization that there is considerable needless, ill directed and ineffective motions. Micro-motion study by the aid of cinematograph pictures of a laborer at work and specially designed clock that shows divisions of time on each picture, followed the old time method of taking still photographs at

intervals to secure a progress record. Industry is turning to the amateur motion-picture camera for aid in solving many production problems.

This is not a plea for the use of the camera to determine the efficiency of the Ribes puller or grubber nor the manipulator of a knapsack sprayer. This situation is hardly comparable to the factory or industrial worker. Efficiency studies of the Ribes worker can more easily be obtained, if needed. Lost motion is all too obvious to the foreman and if he is a good one, he will rectify this.

At last the talkies! The widespread employment in the past by amateurs of the 16 mm. motion picture equipment for various educational purposes gives rise to the thought of how, since the advent of sound, the usefulness of this medium will benefit the educational field. The first experimental 16 mm. sound pictures, the synchronization of several zoological subject of Dr. Raymond L. Ditmars, curator of reptiles of the New York Zoological Park, were of a serious educational nature.

Sound films thus far have found their greatest use in the teaching profession. As equipment and accessories reach a higher state of perfection, there is no doubt but the talkie feature will find a fertile field in a wider range of educational activities. When biological control of blister rust is the thing then perhaps will blister rust talkies be a well established adjunct to the educational work.

Eliminating the talkies as a possibility for a long time to come, it is the belief of the writer that there is a place for the small silent film in the educational phase of blister rust work. Now that the general knowledge of blister rust has been well disseminated through many educational channels, including the old movie film, the progress of each project or activity should be recorded. What better means than by the movie? It is all too obvious, that those directly interested in protecting white or sugar pine, are prone not to get into the field and see the actual work. If this could be brought vividly before them by motion pictures, an added stimulus would be given them to get right out on the grounds. The small movie is ideal to show before organizations directly or indirectly connected with blister rust control, before organizations interested in general forest conservation, and lastly before classes in schools or colleges.

What better progress record could there be for the archives of the Office of Blister Rust Control than rolls of 16 mm. films depicting the activities of work, say, from 1931 to that unknown future date, when we could shoot our friend Goodding with his "little bag of tricks", (I mean spores), distributing this innoculum throughout the white pine forests for biological control of blister rust.

ABSTRACTS OF RECENT IMPORTANT RULINGS BY THE COMPTROLLER GENERAL

Traveling Expenses - Air Travel - Receipts

Where official travel is made by airplane instead of by cheaper means of transportation, reimbursement therefore, in the absence of a showing

of an actual emergency, may not exceed the cost of railroad and Pullman fares between the points involved.

In the absence of a receipt or other evidence showing the amount actually spent for transportation expenses, reimbursement is not authorized, (A-33637).

Traveling Expenses - Subsistence - Air Travel

Travel on official business may be performed by airplane if the cost to the Government does not exceed the cost of railroad fare, plus Pullman fare when length of journey would authorize the use of Pullman accommodations, less land-grant deductions when applicable. 9 Comptroller General 354. When there is available train service leaving at approximately the same time which would not require the use of Pullman berth, the cost of chair only will be allowed.

When the travel is on an actual subsistence expense basis, reimbursement is authorized only for expenses actually incurred for subsistence, notwithstanding that it was less than it would have cost had the travel been by railroad. (A-35108-S).

Traveling Expenses - Airplane Transportation

A direct saving to the Government in the matter of actual expenses of subsistence or per diem in lieu thereof by reason of the shorter time required on an airplane journey, may properly be taken into consideration in determining whether the cost of travel by airplane exceeded the cost by railroad.

The relative value to the Government of the services of an employee in a travel status as compared with such services at headquarters due to the shorter time required by the use of an airplane for official travel is too problematical to permit of its consideration in determining whether the cost of airplane transportation exceeds the cost of travel by rail. (A-35611).

Subsistence Expenses - Transportation Between Temporary Abode and Place of Duty

The expenses incurred by an employee while away from his permanent station, in going from his hotel to his place of duty and returning therefrom, are incident to subsistence and are included in the allowance authorized therefore. (A-32975). (See also Par. 44 - Standardized Travel Regulations)

Travel Expenses - Transportation as a Subsistence Expense

The fact that official business may require the use of a room or an office, other than the room occupied for lodging purposes by an employee in a

travel status, so as to authorize hiring of such a room under the provisions of paragraph 91 of the Standardized Government Travel Regulations, is not controlling in the determination whether the expenses of transportation between the hotel in which such room is hired and other places in the city are to be regarded as necessary transportation expenses or expenses incident to subsistence. (A-34066-S).

Compensation - Dismissals

Where a civil employee of the United States in the Custodial service was dismissed for having forcibly entered a Government store room and unlawfully removed a quantity of Government property, his claim for unpaid salary, which otherwise might have accrued to the date of his dismissal, is of too doubtful validity to warrant payment by any administrative or accounting officer of the Government, (A-32978).

Traveling Expenses - Duty Enroute to First Duty Station

Where an employee is directed to report to Washington or elsewhere in connection with and incident to field work, the exact field station to be determined after receiving certain instructions, he is entitled to salary and subsistence during the period he is performing such service away from his regular post of duty, but he is not relieved from the obligation of reporting to his regular station; i.e., such expense as the employee would have been required to bear if no stop-over had been made to perform duty enroute, (A-33148).

NOTES

S. N. Wyckoff left April 17 for Washington, D. C. on a business trip.

* * *

H. N. Putnam and Kermit Miller returned to the office April 3 from a trip to the Puget Sound region where they inspected infection areas and collected educational specimens.

* * *

H. M. Cowling was on the Coast four days in March taking pictures on infection areas.

* * *

Mildred Storaasli started work in the Spokane office March 30 as Junior Typist under temporary appointment.

* * *

H. N. Putnam and E. L. Joy returned April 20 from a five day trip to Nelson, B. C. where they inspected areas of blister rust infection and gathered rust specimens.

Vol. 6 No. 5

May, 1931

W E S T E R N B L I S T E R R U S T

N E W S L E T T E R

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Confidential

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U. S. Department of Agriculture
Bureau of Plant Industry
Western Office Division of Blister Rust Control
Spokane, Washington

WHY NOT RE-ERADICATE EARLIER

C. H. Johnson

It is just impossible to work with Ribes without learning, and more and more we must learn to put blister rust control on a practical working basis. A few months back a member of our office commenting on eradication methods and costs remarked that "the surface had merely been scratched". His statement contained more truth than poetry.

If in ten years handpulling methods are in general use one responsible for the thoroughness of eradication will defy a checker, or any one interested, in a check, to the extent of betting his shirt that it will be impossible to find 25 linear feet of seed producing Ribes behind an eradication crew. The same man will feel reasonably secure and at ease in letting his pants go along with his shirt, provided he insists on early eradication (April and early May) and late checking (June, July and August). The scene may be along a brushy stream.

While sowing grass seed and burning at Haugan the writer had the opportunity to make some important observations on early development of Ribes inerme leaves and at the same time correct what appeared to be a dangerous situation.

April 8, while engaged at burning dry grass in the proximity of pine seedlings, 26 R. inerme were removed. The grass was dry and light in color. Other species of brush including alder, willow, dogwood and honeysuckle showed only a slight swelling of the buds. R. inerme leaves were partially developed, green and glittering brightly against a dull background. These bushes when missed by the eradication crew in 1930 were neatly camouflaged. To remedy this situation the brush was cut so the swamp grass could be burned annually without jeopardizing outbuildings.

On Big Creek a 14" high R. inerme bush growing under dead Alnus was readily detected at a distance of 63 feet. On upper Savenac Creek and on an area twice worked in 1930, R. inerme were observed. A crew of three men who had never before eradicated Ribes were lined up in regular formation and instructed to keep a careful count and call a bush a bush and even class a clump as an individual bush. They were also instructed to stop eradicating at a point one-half mile up the creek (marked by a fence) where R. inerme was known to be heavy. The area worked covered 12 acres and the report was 682 R. inerme pulled. It is figured that at least 200 bushes were pulled before the men realized that the objective had been reached, but 482 is a conservative estimate of the number of bushes previously missed.

The check over the 12 acres was made April 28. At this early date R. inerme leaves were about one-third developed. Rubus (raspberry) had begun to leaf, marsh grass was dry and burned well, buds of honey-

suckle were beginning to open, but R. inerme was as conspicuous as a sheet of white paper tacked to a blackboard.

Approximately 90 per cent of the so-called missed bushes were either found spreading amidst the tall marsh grass or vining in honeysuckle bushes and apparently concealed from the most exacting Ribes hunter.

In an attempt to correlate this early development of R. inerme with the proper period of eradication, the writer can see distinct advantages such as a longer working season, better detection and more effective work, reduction in time and costs of covering ground.

If earlier eradication can be conducted in the stream type, would not earlier eradication be applicable to upland sites?

A CHECK CANKER TALLY DURING THE AECIAL PRODUCTION PERIOD ON NEWMAN LAKE INFECTION STUDY AREA - 1931

R. E. Myers

A check-tally of trees in the heavily infected zone on the Newman Lake study plot made May 6 by the writer and F. F. Staat is shown below:

TABLE NO.1

CANKER STAGE TALLY ON 5 P. MONTICOLA TREES, BY YEARS, MAY 6, 1931

Tree No.	Juvenile		Pycnial		Fruited Once		Fruited Twice		Fruited Sev.Times		Dead		Total	
	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931	1930	1931
317	7	0	62	12	36	53	0	30	0	0	1	11	106	106
17	34	8	1	6	3	19	0	1	0	0	2	14	40	48
16	3	0	1	0	1	5	0	1	0	0	0	0	5	6
18	52	2	1	0	30	59	0	31	0	0	0	3	83	95
255	66	9	32	18	15	3	0	0	0	0	15	100	128	130
Totals	163	19	97	36	85	139	0	63	0	0	18	128	362	385

Table No. 1 shows a total of 385 cankers or 23 more than the recorded number in 1930. As the majority of these additional cankers were in the juvenile stage and were of small size, it is probable that they were not visible at the time of the 1930 examination. One fruiting canker was found that had an aecial sac with no other attributes of the disease.

The continuous records kept on these trees beginning in 1929 when 1927 cankers would normally begin to appear show conclusively that a great many cankers do not appear the second season after sporidial infection takes

place. A percentage calculation of the cankers that apparently originated in 1927-28 by stages was made from Table No. 1 and the data sheets from 1929, 1930 and 1931, and incorporated into Table No. 2.

TABLE NO. 2

PERCENTAGES OF TOTAL CANKERS ON 5 TREES IN VARIOUS STAGES BY YEARS

Year of Examination	Per Cent of Total Cankers Found					Total
	Juvenile	Pycnia	Fruited Once	Fruited Twice	Dead	
1929	48	1	0	0	0	49
1930	42	25	22	0	5	94
1931	5	9	36	17	33	100

Note that only 22 per cent of the total cankers found in 1931 produced aecia in 1930 and that 5 per cent of these cankers failed to fruit the second time in 1931. However, the increase of dead cankers was 33-5 per cent or 28 per cent from 1930 to 1931 which more than accounts for the difference of 5 per cent. The high percentage in the dead column is due to tree No. 255 (Table No. 1) which appeared to be on the road to death from twig infection. It was included because it is representative of infection conditions that prevail in the zone of heaviest infection on the plot.

If we accept the 1927 origin as absolute for these cankers, then we must also accept the fact that approximately 1/2 of the cankers originating that year did not appear the second year, (1929) to such a stage as to be identified as blister rust.

The writer does not attempt to disprove the wave year theory with this small amount of data but wishes to present the complexities of analyzing infections on pines and fixing the status of the disease.

The records of the cankers tagged at Newman Lake show a wide variation in development through the stages over the same length of time from the time of first appearance to the present stages. This being the case, it is probable that cankers do vary in the time required to develop sufficiently to be seen by the observers.

A HEAVY AND WIDESPREAD WAVE OF INFECTION IN THE INLAND EMPIRE DUE IN 1931

H. N. Putnam

Mr. E. L. Joy and the writer spent April 17 and 18 investigating blister rust conditions near Kootenai Lake in the general vicinities of Nelson, Proctor and Crawford Bay, British Columbia. In 1928, the time of the last visit by members of this office to these points, long and industrious searchings were rewarded with the finding of only a few cankers in close proximity to cultivated black currants. In contrast, scouting in this region

this spring revealed very extensive pine infections. In fact, these pine infections were limited only by the absence of cultivated black currants. Trees near cultivated black currants were almost invariably heavily hit with cankers. These cankers were almost entirely of 1927 and 1928 origin and the majority of them were producing aecia for the first time. Blisters were practically all out and many of them had burst. This condition of the cankers made scouting extremely easy. It is a conservative estimate that there will be produced this year 100 times the volume of aecia as was produced in any previous year. There are in the various infection centers, relatively few cankers younger in development than fruiting for the first time.

An examination of the Newman Lake infection near Spokane, Washington, revealed essentially the same conditions as those seen in the vicinity of Kootenai Lake, British Columbia. The majority of the cankers at Newman Lake are producing aecia for the first time with relatively few in the younger stages of development.

Let us indulge in a few idle calculations. At the end of the 1930 field season there was a known total of 16 pine infections in the Inland Empire. Canker analyses indicate that 5 of these originated in 1923, 10 in 1927, and one in 1928. 15 of these infections are in Idaho and one in Washington near the Idaho line. Let us assume that these 16 known infections represent 2% of the total infections in this region--an assumption highly complimentary to the scouting forces. If these 16 known infections represent 2% of the total infections, then we have a calculated total of 250 originating in 1923; 500 in 1927; and 50 in 1928; or a grand total of 800 pine infections at the present time in the Inland Empire.

We have already estimated that there will be produced 100 times the volume of aecia this year as in any previous year. To err decidedly on the conservative side, let us cut this estimate in half and assume that there will be 50 times as many new pine infection centers formed.

Let us bend over backward still further and assume that there will be produced 50 new pine infection centers in 1931 for every one formed in 1923, ignoring those centers originating since 1923. Surely this assumption is ultra conservative. We have already calculated that there are 250 pine infections originating in 1923. It follows then, that there will be 50 times 250 or 12,500 additional pine infections as a result of this year's aecial spread. Adding to this number the calculated total of 800 pine infections now present, gives us a grand total of 13,300 pine infection centers which will be present when the 1931 wave of infection becomes established.

In round numbers it is estimated that there are 3,000,000 acres of white pine type in the Inland Empire. Dividing 3,000,000 by 13,300 would give us one pine infection center for approximately every 225 acres, if all infections were equally distributed and if no blister rust control efforts were being made. It is realized that the above calculations are

highly fanciful and superficial. Nevertheless, blister rust conditions being what they are, it is inevitable that we are due for an extremely heavy and widespread wave of infection this year, with results somewhat approximating our calculations.

In three years, or in 1934, the innumerable cankers formed as a result of the wave of infection this year will be producing aecia and form a tremendously greater volume of aecia. Each successive wave will be correspondingly more severe. A consideration of these inevitable happenings brings home to us very strongly the immediate need of performing control work as rapidly and as thoroughly as possible over the white pine areas in order to reduce to a minimum the inevitable damage to pines.

ERADICATION OF RIBES INERME ON THE NEWMAN LAKE INFECTION STUDY AREA

R. E. Myers

A tabulation of R. inerme eradicated on the Newman Lake infection study plot indicates the difficulty of blister rust control by the hand-pulling method. The records of six times over are shown in the following table:

RIBES INERME ERADICATED ON NEWMAN LAKE INFECTION STUDY PLOT

Date	Feet of Live Stem			Man Days
	Old Growth	New Growth	Total F.L.S.	
May 6,7,8, 1929			121,404	26
May 27, 1929			4,487	14
June 15-Aug.25, 1929			993	2*
Total 1929			126,884	42
May 6, 7, 1930	445	446	891	10
June 6-Aug. 23, 1930	60	61	121	1*
Total 1930	505	507	1,012	11
April 23, 1931	174	272	446	8
Grand Total	679	779	128,342	61

*Calculated.

THE EFFECTIVENESS OF STREAM TYPE RIBES ERADICATION

E. L. Joy

In this issue of the News Letter appears an article by Mr. Putnam entitled "A Heavy and Widespread Wave of Infection in the Inland Empire Due in 1931", in which it is predicted that the great

volume of aecia now being disseminated would cause "one pine infection center for approximately every 225 acres if all infections were equally distributed and if no blister rust control efforts were being made". What about our control efforts?

A few more idle calculations should not be out of order when one deals with such a worthy subject as the control of white pine blister rust, especially if these calculations are built around our efforts toward control. Therefore, let us speculate on the effectiveness of control measures which have been applied through the stream type Ribes eradication work.

Stream type Ribes represent the most vital point for both the entrance and intensification of the disease because of: (1) the occurrence in stream type of the most susceptible species; (2) the growth of these plants in large quantities; (3) the absence of dense timber in the stream type; (4) the presence of pronounced wind currents along the stream course; and (5) the occurrence of a relatively high humidity over this moist area. The initial stream type eradication work results in the removal of approximately 95 per cent of the stream type Ribes live stem. The writer estimates that the removal of this 95 per cent is the equivalent of removing 75 per cent of all Ribes live stem on an area. Therefore, theoretically, where stream type work has been done, there has been removed at least 75 per cent of the target which the spores must hit and thereby theoretically reducing the amount of infection at the end of 1931 to one center for approximately every 900 acres.

In the vicinity of Elk River, where most of the stream type work has been completed, 7 centers of infection have been found within a block of 4 townships. If these 7 centers represent 2 per cent of the existing infections in the vicinity of Elk River, which is a block of 16 townships, we already have one infection on every 1,050 acres.

The volume of aecia now being produced is tremendous. If we assume that each of the infections in the vicinity of Elk River would have caused 25 new infections by the end of 1931, if no eradication work had been done, the result would have been one infection for every 40 acres. However, with only 25 per cent of the spore target left after eradication, theoretically we have reduced the amount of infection to one center for every 160 acres.

Although the foregoing discussion is merely a speculation as to what the control work has accomplished, it seems certain that the removal of stream type Ribes is the most important step towards control of the disease, especially in a locality where pine infection is known to exist. Surely the removal of 95 per cent of the stream type Ribes is causting a very great reduction in the number of new infection centers started.

MORE ABOUT BURNING AND TURF

C. H. Johnson

The period just passed (April 6-30) will always be remembered as the most interesting days the writer has ever devoted to Ribes eradication. With time has come assurance beyond a reasonable doubt that Ribes

will be replaced providing we so choose to have them replaced. Heretofore and without mentioning costs so much remained to be demonstrated before any advancement could be made beyond the talking stage. The worm has turned. Establishment of a turf seems assured. Ribes and brush are giving away. Firing is doing the stuff and is being conducted with a greater degree of safety. The cows may eat the grass or leave it. A Ribes eradication job is simmering down to a patrol or inspection job.

At favorable moments (by taking advantage of winds) broadcast burning by patches was conducted over grass and brush areas for two miles along the St. Regis River, three-quarters of a mile on Big Creek, and one mile of brush piles burned on Savenac Creek. This burning occurred before the recognized fire season, before May 1, after which date fire permits are required. This firing also took place during a period when the slopes were saturated with moisture and partly covered with snow. (The Regional Forester and a Forester from Washington, D. C. were present part of the time. There was no evidence of nervousness). The burns were just as satisfactory as if they had been made in July, August or September.

Along the St. Regis River an area sprayed in 1928 and resprayed and burned in 1929 was searched for seedlings and sprouts and pronounced Ribes free at the termination of the 1930 season; a second fire was run over the area burning dead willow and debris which had accumulated as a result of the winter snow breakage. The area is now practically free from live willows or willow sprouts. With slight preparation the burn could have been made clean, but it was anticipated that a third burn in 1933 may be desirable to remove willow sprouts or Ribes seedlings which may occur during the intervening period. The time element was negligible; if converted into costs would not have exceeded 50 cents. The area comprised approximately five acres. Both knapsack and a power sprayer were once used on this area.

On the St. Regis River experiments were conducted on green willow and dense clusters of R. inerme neither of which had previously been treated with a chemical spray. A fire was whipped through one-half acre of willow 20-25 feet in height and containing a dense understory of partially dead brush and R. inerme. The understory was completely cleaned. A layer of ash 1/2 to 1 inch in thickness was uniform over the area. A pasture mixture was sowed in the ashes. Cattle can now penetrate the thicket with ease and it is estimated that 90 per cent of the standing large willows were killed. Three matches and four minutes time were consumed. Dry ungrazed grass started the burn.

West on the St. Regis River and beyond the mile limit, clusters of R. inerme, estimated at 5,000-10,000 linear feet of live stem per acre, associated with willow and smaller brush were fired. Dense clumps of R. inerme 4-5 feet high were completely consumed.

The results cannot yet be determined, but it is safe to wager that the last year's seed crop was destroyed with the bushes, underbrush

was removed and willows weakened. The time and material converted into costs would not exceed 10¢. The area was approximately 1/5 of an acre in size. Adjacent to this area is a 1/3 acre plot on which the writer helped to eradicate R. inerme in September 1928, at a cost of $55.00 per acre. There is quite a contrast between 50¢ and $55.00. Both plots are open for inspection.

If this method of burning can be developed with safety and applied to similar areas, the complete cost of eradication and all necessary re-eradication in the heaviest concentrations of R. inerme and brush should not equal $5.00 per acre. Grass helps materially in setting fires; when not grazed it attains size and when dry burns readily and generates sufficient heat to sweep clean everything in its wake.

On Dry Creek, in the vicinity of Savenac Nursery, another experiment in clearing and burning is being tried. For a distance of one mile along this drainage 40 to 50 per cent of the brush, dead and alive, was cut or broken down and piled. Sufficient grass was sowed which, together with the voluntary grass, will form a good stand. The cost of brush clearing just recently completed was $9.27 per acre. It is planned to burn the brush together with the grass in 1932.

Fire is sometimes classed as an enemy, but if judicially handled it might be termed an ally. Land settlers are permitted to burn to raise their crops. Fire is widely used to clear and maintain right of ways for roads, railroads and telephone lines. Fire is used within our forests to improve conditions. Why should we not adopt sane rules regulating both the starting and extinguishing of fires along streams to remove piles of living Ribes and prevent the spread of white pine blister rust?

RIBES MEASUREMENT

R. E. Myers

The white elephant of live stem estimates has been thoroughly "cussed" and discussed in past issues of the News Letter by various individuals fully qualified in both the former and the latter modes of expression.

The writer is in hearty accord with sentiments heretofore expressed regarding "conscientious approximations" for problems encountered in damage to pine studies, and feels that if estimates of live stem could be made 99 2/3 per cent right the information would still be inadequate.

Blister rust does not develop on live stem but does do so on the Ribes leaves. This being the case, the problem is to find the area of leaves on Ribes that causes a certain number of cankers on associated pines and consequent damage. The writer does not wish to discourage the use of live stem as a quantitative measure of Ribes on other problems where it is convenient and applicable.

Since leaves are the part of Ribes utilized by the disease in its life cycle, it is obvious that the best place to look for knowledge

is the leaf data collected and compiled by the ecology project.

Briefly, a series of attempts to correlate leaf area with feet of live stem ended in complete failure, but an old morphological principle was uncovered that is elementary in botany, namely: that leaves of plants are produced for the purpose of utilizing all available light for food manufacture and tend to arrange themselves into patterns with their planes at right angles to the light rays. That this habit is normal may be verified by observing any broad-leaf plant.

The ecology project personnel had measured the area in square inches of all of the leaves and the area was recorded for each bush. The field data included the area in square feet of ground space shaded by the bush, recorded as "bush area". With these data the writer and W. A. Rockie totaled the areas in square inches of the leaves and bush areas of 14 bushes at random from the collection and computed the ratio. The bush area was 1,392 square inches and the leaf area 2,046 square inches. The ratio was 1:1.47. That is to say, for each unit of bush area used there were 1.47 units of leaf area.

The results of this sample calculation of bushes, not classified according to site or other factors, encouraged further investigation. This was done with the data on 118 R. lacustre bushes on which bush area data were recorded. The bushes were segregated into 3 site classes or forms (1) open or 0-25 per cent shaded; (2) one-half shade or 26-50 per cent shaded; (3) full shade or 51-100 per cent shaded, under the premise that these forms express the source of light and quantity inasmuch as the open form would receive light from over head and all sides; one-half shade, light from over head with little or none from the sides, and the full shade form reduced light from over head. A tabulation of these data follows:

BUSH AREA - LEAF AREA RATIOS

Site Form Degree of Shading	No. of Bushes	Bush Area Square Feet	Total Area of Leaves Sq. Feet	Ratio of Bush Area to Leaf Area: Bush Area = 1
Open Form 0-25% shaded	43	74.58	87.69	1: 1.18
1/2 Shade 26-50% shade	31	89.55	82.41	1: 0.92
Full Shade 51-100% Shaded	44	103.15	63.90	1: 0.62
All forms	118	267.28	234.00	1: 0.87

It is well to bear in mind that the areas of these R. lacustre bushes were individually measured green and dry and the areas of 1,000

leaves planimetered to check the accuracy of the circle-scale measures. Then consider that for the whole group the total bush area is but 13 per cent less than the measured leaf area. In other words, the simple field measurements of bush area were 87 per cent accurate.

The variation of the ratios of the three forms indicates that the leaf mosaic theory is sound, since the open form shows a greater total leaf area than the total bush area. The 1/2 shade form bush ratio of 1:0.92 indicates a leaf mosaic approaching perfection. The full shade ratio of 1:0.62 indicates unknown factors that modify the mosaic habit of Ribes growing under these conditions. In general, it would seem that the possibilities in this method of estimating the essential leaf area for damage to pine studies are worthy of further investigation.

The writer invites comment, criticism and suggestions as to the practicability, utility or what have you.

BLISTER RUST DEMONSTRATION AT SPORTSMEN'S FAIR

Information on all phases of the blister rust situation in the Inland Empire was made available to 86,381 persons through the medium of the Annual Sportsmen's and Tourists' Fair held in Spokane May 11 to 17.

A western white pine tree seven feet tall, killed by blister rust on the Newman Lake infection study plot, attracted much attention although the main attraction of the exhibit was the series of colored lantern slides with complete legends. This series told the story of blister rust far more effectively than any person could. Large colored photographs of various phases of the work also came in for much attention.

The exhibit was disappointing to the educational department for material had been made ready to fill a 12 x 30 foot space and only a 10 x 12 space was allowed at the last minute. However, the visitors at the fair seemed to get much information from the small amount of material used.

The fair this year ran for seven days instead of six as in former years, and the added day seemed justified as nearly 8,000 persons attended the last day.

NEW STUDIES AT NEWMAN LAKE

F. F. Staat

Three very interesting studies were inaugurated this month with the planting of approximately 2,300 disease-free white pine transplants, on the Newman Lake infection study plot near Spokane, Washington. These transplants, 975 each of Pinus monticola and P. strobus, and 364 of P. flexilis, were shipped from the Wind River Forest Nursery where they

were grown from seed supplied by Mr. S. B. Detwiler.

The new investigations to be conducted on this area are:

1. A study of the relative susceptibility of P. monticola, P. strobus and P. flexilis to white pine blister rust in the Inland Empire.
2. A study of the relative resistance after infection takes place, and of the rate of killing of white pine transplants by this disease.
3. A study of the effectiveness of the eradication of all Ribes except R. lacustre after the disease has become firmly entrenched in a drainage.

Small planting sites were selected well distributed over the area and in close proximity to concentrations of R. lacustre. The trees were planted 3.3 feet apart each way in separate "species" rows. The following table sets forth, briefly, the pertinent facts regarding each planting site, tabulated as they occur from the west to the east sides of the Newman Lake infection plot:

Site No.	Soil Conditions	*Ribes lacustre Association Within 1 chain radius	Native Pinus monticola Association within 1 chain radius	No. Trans-plants
1	Excellent; very moist, loamy, fairly well shaded.	Excellent; 33 plants--4 on site; 1,274 F.L.S.	Excellent; 28 trees--4 on site. No infection; 5 chains to nearest infected pine.	(3 species) 315
2	Good; very moist to fairly dry; part brushy, open meadow.	Good; 19 plants--none on site; 527½ F.L.S.	Good; 5 trees--none on site. No infection; 2 chains to nearest infected pine.	(2 species) 270
3	Excellent; light moist, loamy with little gravel.	Fair; 8 plants--none on site; 171½ F.L.S.	Very good; 21 trees--3 on site. 1 infected pine, 2 cankers.	(2 species) 288
4	Excellent; light, moist, loamy to gravelly; shady.	Very good; 17 plants--2 on site; 400½ F.L.S.	Excellent; 27 trees--2 on site. 12 infected pines, 496 cankers.	(3 species) 513
5	Good; very moist to fairly dry; rather heavy; quite open.	Poor; none. (11 plants within 2-chain radius).	Very good; 23 trees--none on site. 2 infected pines, 7 cankers.	(2 species) 396
6	Poor; dry clay loam; upper edge of open meadow; heavy with much grass turf.	Poor; none. Abundant R. lacustre 3 to 4 chains away.	Poor; 4 trees--none on site. No infection. 2 chains to nearest infected pine.	(3. species) 264
7	Very poor; dry clay loam; lower edge of open meadow heavy with abundant grass turf.	Poor; none. Abundant R. lacustre 2½ to 3 chains away.	Fair; 3 trees-- 1 on site. No infection; 6 chains to nearest infected pine.	(2 species) 266

*The feet live stem (F.L.S.) given is from the 1930 records.

Because only 364 P. flexilis transplants were available, only three sites (1, 4 and 6) were planted to this species, in equal amounts

with P. monticola and P. strobus. These units are located, one near the east side, one near the west side, and one at the center of the plot. Thus a study of the comparative susceptibility of the three species at varying distances from the main center of infection will be made, along with the three studies already outlined.

DEATH OF PINUS MONTICOLA BY TWIG KILLING AT NEWMAN LAKE, WASHINGTON

R. E. Myers

H. N. Putnam, early in April this year, found tree No. 257 on the Newman Lake Study Plot, had succumbed to the rust by twig killing. This is a type of damage that will be inevitable in reproduction and pole stands of western white pine where heavy concentrations of susceptible Ribes are found in close association with the trees.

Death of the tree appears to have been the result of foliage reduction by twig killing beyond the minimum requirements for food manufacture. There were five trunk cankers in all, apparently alive June 6, 1930, three of them six feet and two of them five and one-half feet above ground. As the tree was only seven feet tall and with green limbs beginning one foot above the ground, girdling of the trunk was not the primary cause of death.

The writer, while engaged in making a tally of cankers for an article for this publication, found a tree approximately 30 feet southwest of tree No. 257 that appeared to be succumbing to the rust, if dead cankers and dead limbs are significant factors. Eighty or ninety per cent of the twigs were found to be drying up and the needles were beginning to turn yellow.

A comparison of this tree to the dead tree was made by using data taken in 1930 on the dead tree and 1931 data on the dying tree and incorporated into table No. 1.

COMPARISON OF DATA ON TREES NUMBER 257 AND 255

Tree No.	Age Yrs.	D. B. H. Inches	Height in Feet	Feet of Needle Bearing Stem	Total Number of Cankers	Number of Cankers per M Feet of Needle Bearing Stem	Per Cent of Total Cankers Dead Last Exam-ination
257	20	0.75	7	40	110	2,750	40
255	25	2.00	17	240	128	533	78

A probable index to the amount of infection necessary for twig killing lies in the quantity of foliage, reducing the number of cankers

on tree No. 257 to number per foot of needle bearing stem gives an average of 110/40 or about 3 cankers per foot.

If tree No. 255 dies this year with 128/240 or 1/2 canker per foot of needle bearing stem requiring only one more year to kill, it would seem that tree No. 257 would have died with a lesser number of cankers.

As time goes on we will have at Newman Lake an increasing number of trees killed by the rust and further studies will be initiated.

These dying trees will be splendid demonstrations of the necessity for control maintenance in young stands of western white pine.

NEW EXPERIMENTAL PINE PLANTATIONS IN IDAHO

E. L. Joy

On May 18 a shipment of 10,000 white pine transplants, 5,000 each of Pinus monticola and P. strobus was received from the Wind River Nursery. This stock was immediately dispatched to the Potlatch and Clearwater regions in Idaho where four plantations will be started, each in a locality where pine infection exists and Ribes eradication work has been done or will be done in 1931.

These plantings are being made for the purpose of studying the effectiveness of the control work done and at the same time to determine the comparative susceptibility of the two species used. The latter study is also being conducted on areas at Cheekye, B.C., Buck Creek and Pysht, Washington, all in the Coast region, and at Newman Lake, Washington, in the Inland Empire.

NOTES

S. N. Wyckoff left May 16 on a business trip to Cheekye, B.C. accompanied by S. B. Show, T. D. Woodbury of the U. S. Forest Service in Region 5 and Willis Wagener of the Division of Forest Pathology. H. N. Putnam joined the group at Vancouver, B.C.

* * *

Most of the men of the eradication project left for the field on May 18 to start the training school for camp bosses and supervisors.

* * *

C. O. Peterson returned to the fold May 15 after spending the winter on quarantine inspection work at Portland, Oregon. George Whiting returned from Denver, Colorado May 16. He was on quarantine inspection work there.

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June, 1931

W E S T E R N B L I S T E R R U S T

N E W S L E T T E R

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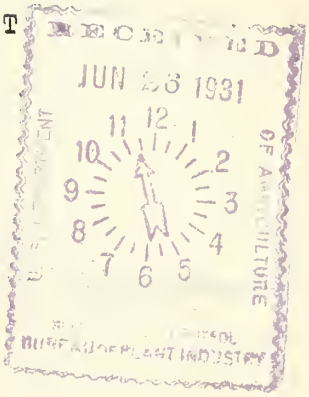

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U. S. Department of Agriculture
Bureau of Plant Industry
Western Office Division of Blister Rust Control
Spokane, Washington

THE 1931 WESTERN PROGRAM

Blister rust control work in the West is now entering upon its season of greatest activity. More practical control work will be done this year than in all previous years combined. As in the past, the work in the West is sharply divided into practical control and experimental work, with the bulk of the former concentrated in Idaho.

The present organization for the eradication of wild Ribes from the white pine stands of the West did not spring up over night but is the outgrowth of much experimental work, the amalgamation of methods tried and found successful and the elimination of those which proved unsatisfactory. The present plan is economical and efficient but experimental work is being continued with the knowledge that new methods can be developed which will lower the cost of the work and increase the output per man with no increase in effort expended. No one knows now along which line of endeavor the future of the work lies. It may be in improved sprays, it may be in the use of stem injection equipment or in the scientific handling of the ground to suppress the Ribes and induce the growth of desirable ground cover. The ultimate plan may be a combination of all present known methods according to the specific area being worked.

The development of methods of eradicating wild Ribes has been rapid. In July, 1923 a small group of men arrived in Spokane to begin the job of controlling white pine blister rust in the Inland Empire. During 1922 the Western Office of Blister Rust Control was located in Seattle and the work consisted largely of a general survey of the western field to determine the actual extent of newly found infections. About the only thing known of the problem in Idaho when work was started was the Ribes species to be found over the general area. This information was available from botanical records. There was no information extant which would give any idea as to the exact types or locations of the various species and the extent to which they would be found in one locality or another. About all that was actually known was that Ribes grow profusely in the white pine type and that the job of finding and removing them would be a tough one. Since that time much valuable information has been secured.

Experimental work was started in 1923, has been carried on continuously since that time and is being continued this year. New methods being tried out this field season consist of stem injection tools built to apply chemical in paste form into the stem of the plant near the crown, crown applications of salt in both solution and dry form, and new sprays developed in the laboratores at Berkeley, California and Moscow, Idaho during the past winter. The stem injection work and the salt experiments are being carried on at the methods camp on the Clearwater National Forest under the supervision of H. E. Swanson. H. R. Offord will do no new work at either Clarkia or Santa this year but will select a new area on which to test out the new sprays developed. An important phase of this program is the development of new injection tools and spraying equipment by J. F.

Breakey and G. R. Van Atta. Swanson is constantly experimenting to secure new and better methods of hand pulling and spray applications.

The operations this year on the lands of the Clearwater National Forest; the Clearwater, Potlatch, Coeur d'Alene and Priest Lake Timber Protective Associations; at the Savenac Nursery at Haugan, Montana and on Mount Rainier National Park consist of practical control according to the best known working methods.

In Oregon extensive reconnaissance of white pine lands is being carried on. This work will start in the sugar pine region in southern Oregon and as much of the white pine area as possible will be worked. In California several years have been spent on experimental Ribes eradication on the Stanislaus and Plumas National Forests. This year eradication will be performed on the Lassen National Forest and reconnaissance work on the Klamath National Forest.

These practical operations are not the only lines being followed. More technical investigations are also under way. Ribes ecology studies are being conducted in Idaho and California which will complete the general picture of Ribes growth in both the white and sugar pine regions where control must eventually be practiced.

Another group of men under H. N. Putnam will study each new pine infection as soon as found to determine the amount of Ribes which caused that infection. They will also study the areas on which eradication has been done to determine the effectiveness of the work in preventing blister rust infection. The Division of Forest Pathology of the Bureau of Plant Industry is carrying on more technical studies in British Columbia to determine the relative susceptibility of the various Ribes species to blister rust infection.

From this account it will be seen that the western program is highly complex, with numerous studies and experiments aiming at the common goal of improved working methods and greater efficiency in the practical control of blister rust.

UREDINIA LATE AT BREMERTON, WASH.

The first appearance of the uredinial stage of blister rust on Ribes in the Bremerton, Washington area was reported by S. E. Paschall on May 30. Only one bush of Ribes bracteosum was found infected. This is the latest appearance of uredinia in that area in the last four years. In 1930 this stage appeared May 6, in 1928 it appeared May 11, and in 1929 on May 22.

The late appearance this season in that area is hard to explain in the light of the fact that aecia was produced on March 1, the earliest date in the last four years. In 1928 the first aecia appeared March 19,

in 1929 the first was noted on April 7, and in 1930 the opening day was March 16. One possible explanation of the late appearance of uredinia this year is that the volume of aecia produced was far smaller than in former years.

H. N. Putnam reports that uredinia was in evidence in the Marion Lake region of Oregon May 12. E. L. Joy inspected the Newman Lake infection area near Spokane on June 4 and reported abundant uredinial infection on R. lacustre. "It is probable that the spots have been visible for a week or ten days as they are large and well developed," Joy said. Aecia was first noted at Newman Lake on April 6 and none of the pustules were broken open on that date.

SUMMARY OF ALL PINE INFECTIONS KNOWN IN WESTERN UNITED STATES

H. N. Putnam

Recently there has been completed the compilation of all known pine infections in Western United States. This compilation included an exact location of the infection, number of pines examined and number infected, abundance of cankers, probable year of origin of infection, age class of pines, the associated Ribes by species and abundance and the year infection was found. This paper constitutes a summary and partial analysis of the compilation of pine infections.

There is a known total of 98 pine infections in Western United States divided as follows: 72 in Washington, 10 in Oregon, 16 in Idaho.

These infections have all been found from the fall of 1921 to this spring. They range in probable years of origin from 1916 to 1927. There is a wide latitude in the use of the term center of infection. As used in this paper it may consist of a very small infection of only a few infected trees or it may include an infected area of a square mile or more on which infection is general.

The material has been analyzed in four ways as shown in the four tables. These four ways are: classification of cankers according to (1) probable year of origin, (2) year found, (3) year of origin and time elapsing until the infections were found, and (4) Ribes species probably chiefly responsible for the infection.

In considering these analyses the data must be taken with large dosages of salt. Owing to the human inability to find all of the infections or in every case to find the causative Ribes or even the main center of infection, the year of origin of infection as set down in the table is not necessarily a true date. In many cases the cankers found were insufficient in number to give a clear cut idea of when infection originated. Also, particularly in older infection centers, often the very few first formed cankers were not found. However, it is hoped that points of value may be brought out which will warrant the time

spent in the preparation of these tables even if they are based, in many instances, on insufficient data and well intentioned guesses.

TABLE NO. 1

NUMBER OF ALL KNOWN PINE INFECTION CENTERS IN WESTERN UNITED STATES CLASSIFIED ACCORDING TO PROBABLE YEAR OF ORIGIN OF INFECTION AND REGION

State	County	Probable Year of Origin of Infection											
		1916	1917	1918	1919	1920	1921	1922	1923	1925	1927	Not Known	Tot.
Wash.	Clallam				1		4		8			1	14
	Island							1					1
	Jefferson			1		3	1	1	3			2	11
	King										1		1
	Kitsap	1				6		1	2				10
	Lewis										1		1
	Mason							1					1
	Pierce						2				1		3
	Skagit	1					3		1	1		1	7
	Skamania					1					3		4
	Snohomish			1					1				2
	Spokane								1				1
	Whatcom	1	2		3	4	3	2	1				16
Total	13	3	2	2	4	14	13	6	17	1	6	4	72
Oregon	Clackamas								1	2	1	1	5
	Hood River								1			1	2
	Linn		1										1
	Multnomah									1			1
	Wasco										1		1
Total	5		1						2	3	2	2	10
Idaho	Clearwater								3		10		13
	Shoshone								1		2		3
Total	2								4		12		16
Grand Totals	20	3	3	2	4	14	13	6	23	4	20	6	98

Attention is directed to Table No. 1 in which the number of pine infection centers in Western United States have been classified according to probable year of origin of infection.

With one exception all of the counties in Washington in which pine infection is known are located west of the Cascades. It may be observed that there are three pine infection centers in western Washington originating probably in 1916. In 1920 and 1921 and in 1923 the majority of known pine infection centers in western Washington originated. Very little scouting has been done in western Washington since 1927. There is little doubt that had intensive scouting been done in western Washington since 1927 very large numbers of pine infection centers originating since 1923 would have been found.

In Oregon, with the exception of one pine infection center originating in 1917, the oldest infection center found probably originated in 1923. The infection found in Linn County, originating probably in 1917 is of special interest. This infection was found in the summer of 1930. A study of this infection this spring clearly showed that infection originated here in 1917.

In Idaho, all of the 16 infection centers known apparently originated in 1923 or since 1923. Owing largely to the fact that since 1927 more intensive scouting has been done in Idaho than in the other regions, there is a larger number of infections originating in 1927 in Idaho than in the other two states.

TABLE NO. 2

NUMBER OF ALL KNOWN PINE INFECTION CENTERS IN WESTERN UNITED STATES CLASSIFIED ACCORDING TO YEAR FOUND AND REGION

State	County	Year Found									
		1921	1922	1924	1926	1927	1928	1929	1930	1931	Total
Wash.	Clallam				4	10					14
	Island						1				1
	Jefferson			2	3	6					11
	King						1				1
	Kitsap				3	7					10
	Lewis								1		1
	Mason					1					1
	Pierce								3		3
	Skagit	1				6					7
	Skamania					1			3		4
	Snohomish					2					2
	Spokane						1				1
	Whatcom		1	1		13	1				16
Total	13	1	1	3	10	46	4		7		72
Oregon	Clackamas						2	2	1		5
	Hood River						1	1			2
	Linn								1		1
	Multnomah							1			1
	Wasco							1			1
Total	5						3	5	2		10
Idaho	Clearwater							3	9	1	13
	Shoshone							1	2		3
Total	2							4	11	1	16
Grand Totals	20	1	1	3	10	46	7	9	20	1	98

Reference is made to Table No. 2 in which the known pine infection centers have been classified according to year found.

Pine infection in Western United States was first found in Washington in 1921. It was not until 1928 that pine infection was first found in Oregon. In Idaho no pine infection was known until 1929.

In 1927 a quite comprehensive scouting program was conducted in western Washington. This work was performed by four crews of men working 5 or 6 weeks during the summer. As a result there were found 46 pine infection centers quite well distributed chiefly in the northern half of western Washington.

In 1922 in western Washington, western Oregon and northern Idaho very intensive black currant campaigns were made. During the course of this work much attention was given to looking for the rust not only on cultivated black currants but on other Ribes species and on pines. Only one pine infection was found. This was in Whatcom County, Washington, within a mile of the Canadian boundary. From Table No. 1 it may be observed that there were 25 pine infections originating in 1920 or earlier in western Washington. These pine infections were visible in 1922 when the intensive black currant eradication and scouting campaigns were carried on. However, it is probable that in each of these 25 pine infections there were in 1922 only a few cankers visible and very difficult to find. This experience in not being able to find pine infections until they are well developed is characteristic of the work in scouting for blister rust.

Since 1927 the major effort in scouting for blister rust has been made in the Idaho white pine belt. In 1928 an intensive scouting of the most probable locations of blister rust in northern Idaho was made. Scouting efforts were chiefly concentrated in stream types, particularly where Ribes petiolare and R. inerme were found in abundance. In the Clearwater and Potlatch regions of Idaho, Ribes infection was found quite widely distributed but it was not until 1929 that pine infection was found chiefly in following up infection leads as shown by Ribes infection the year before. In 1930 there was found in Idaho a total of 11 additional pine infection centers. It is probable that many more will be found this year. The known pine infection centers in Idaho are all in the southern half of the white pine belt. No pine infection has been found north of the Coeur d'Alene River, although in 1928 several small Ribes infection centers were found. Examination of pines near these Ribes infections has been done yearly since 1928.

Attention is called to Table No. 3 in which an attempt has been made to bring out the relationship between the time of probable origin of infection and the time the infection was found. It may be observed that this lapse of time ranges from one year to 13 years. In 26.1 per cent of the cases infection was found 3 years after its probable origin. This fact brings out the value of following Ribes infection leads. It will be remembered that in the majority of cases cankers produce aecia the first time three years after the pine became infected. Near-by Ribes leaves become quite heavily rusted. By attempting to find concentrations of infection on the Ribes there is a high likelihood that the cankers

responsible for the heavy infection will be found. That this is the case is brought out by the fact that the highest per cent of pine infections was found three years after the probable year of origin of infection.

TABLE NO. 3

TOTAL NUMBER OF KNOWN PINE INFECTION CENTERS IN WESTERN UNITED STATES CLASSIFIED BY PROBABLE YEAR OF ORIGIN AND TIME ELAPSING UNTIL THEY WERE FOUND

Lapse of Time in Years From Probable Year of Infection to Year Found	Probable Year of Origin of Infection											
	1916	1917	1918	1919	1920	1921	1922	1923	1925	1927	Total	Per Cent of Total in Each Year of Elapsed Time Class
1										1	1	1.1
2									1	3	4	4.3
3				1		1		5	2	15	24	26.1
4					2			11		1	14	15.2
5	1						5	3	1		10	10.8
6					3	10	1	3			17	18.5
7				1	9			1			11	12.0
8				2							2	2.2
9			2			2					4	4.3
10	1	1									2	2.2
11	1	1									2	2.2
12											0	0.0
13		1									1	1.1
Totals	3	3	2	4	14	13	6	23	4	20	92	100.0
Per Cent of Total in Each Year of Origin	3.3	3.3	2.2	4.3	15.2	14.1	6.5	25.0	4.3	21.8	100.0	

Note:- there are 6 pine infection centers whose years of origin are not known. These are not included in this table.

It is very unusual to find infection the year following its probable year of origin. There is one case shown in Table No. 3 where this happened. In this particular instance there were young fast-growing pines very closely associated with Ribes bracteosum on the west side of the Cascades near the summit. Inspection at this spot in August, 1928 showed very heavy Ribes infection but even an intensive scouting of the associated pines showed no infection. On October 8, 1929 the area was

again scouted more hurriedly and on 2 trees previously examined 2 very young cankers, probably originating in 1927, were found.

It may be observed that 6 years after infection 18.5 per cent of the infections were found. Here again the value of following Ribes infection leads is seen. Within 6 years after the origin of infection the second wave cankers are producing aecia for the first time with a consequent heavy infection of the associated Ribes. In this situation pine infection is usually much more numerous than within 3 years of origin and is much easier to find.

In Table No. 3 it may be observed that there is an apparent correlation between the probable year of origin of infection and the lapse of time until infection is found. The longest time before infection is found is observed to be at those points where infection is the oldest. While this is true it is significant only of the fact that intensive scouting for the rust did not begin until 1922 and that over 80 per cent of the cankers were not found until 1927. Hence it is obvious that since the majority of the pine infections have been found in the last few years only, the oldest infection centers would naturally show the longest lapsed time. Had scouting been done on the same basis throughout the West from the time infection first entered the country until the present time it is probable that these older infections would have been found much earlier and that the lapsed time would have reached a much more constant figure.

TABLE NO. 4

TOTAL NUMBER OF PINE INFECTION CENTERS KNOWN IN WESTERN UNITED STATES CLASSIFIED ACCORDING TO RIBES SPECIES PROBABLY CHIEFLY RESPONSIBLE FOR THE INFECTION

	Ribes Species Probably Chiefly Responsible for Pine Infection										
State	R. nig.	R. vulg.	R. bract.	R. pet.	R. sang.	R. iner.	R. vis.	R. div.	R. lob.	Not Known	Total
Washington	2	1	43		15	1		5	1	4	72
Oregon			4		1					5	10
Idaho				15			1				16
Total	2	1	47	15	16	1	1	5	1	9	98

In Table No. 4 the pine infection centers have been classified according to the Ribes species probably chiefly responsible for the infection. In this table the attempt has been made to ascribe to a single Ribes species the bulk of the burden of causing pine infection. It is, of course, understood that in practically every infection the Ribes responsible do not consist of a single species but several species. The material in Table No. 4 must be considered as indicative only and not conclusive. For instance it may be observed that only 2 of the 98 pine infections are ascribed to Ribes nigrum. It is quite probable that many of the infections originating previous to 1922 were originally chargeable to R. nigrum removed before the infection was found.

It may be observed in Table No. 4 that the majority of the cankers found in Washington and Oregon are chargeable to R. bracteosum. In this connection it must be remembered that with one exception all of the cankers found in these two states were on the west slopes of the Cascades where R. bracteosum is abundant.

In Idaho the potency of R. petiolare in starting pine infection is obvious, 15 of the 16 known pine infection centers being chargeable to R. petiolare and only one to an upland type Ribes. In this connection it must be remembered that the bulk of our scouting work has been done in the stream types where R. petiolare is abundant. The upland types supporting R. viscosissimum and R. lacustre in close and abundant association with young white pines have not been covered to the extent that the stream types have. More attention is being given now to these upland types and it is probable that many infections will be found chargeable to R. viscosissimum and R. lacustre.

Summary

In Western United States scouting efforts from 1921 to the present time have brought to light 98 pine infection centers of which 72 are in Washington, 10 in Oregon and 16 in Idaho. The oldest of these infections probably originated in 1916. The years since 1916 showing the origins of the greatest number of infections were 1920, 1921, 1923 and 1927. Over 80 per cent of all infections known in Western United States have been found since 1927.

Experience has shown that usually three or more years elapse between the time infection originates and the time it is found.

The Ribes species responsible for the greatest number of pine infections in the Cascades of Washington and Oregon were R. bracteosum first and R. sanguineum second.

In Idaho, R. petiolare was probably responsible for 15 of the 16 pine infection centers found.

STEM INOCULATIONS ON SPRAY RESISTANT RIBES

C. C. Strong

Much has been said, pro and con, regarding the most promising method of destroying R. inerme bushes which has so far been used experimentally. There is no need of emphasizing that R. inerme bushes have proven resistant to sprays and that hand pulling of that species is neither economically feasible nor effective for controlling blister rust. This new method is what is rapidly becoming known as the stem injection method.

When Offord and his assistants, after obtaining good results on preliminary tests, pointed to stem injections, using a heavy metal paste as the killing agent, as the most promising means of killing the spray resistant Ribes with one application they opened the field for the development of a distinctly different type of Ribes eradication tool. As a

result, two stem injectors have been developed, one by Van Atta in California and one by Breakey at Spokane. Although these tools differ widely in principle, they accomplish the same end. However, it is not the purpose here to go into the details of these machines but rather to record briefly what results have so far been secured on Ribes injected with a copper complex paste by means of Breakey's stem inoculation tool.

On May 6 and 7 three plots were established at the junction of the North Fork with East River just north of the Rocky Mountain Forest Experiment Station at Priest River, Idaho. On one of these plots, inoculations were made on stems and roots immediately above and below the main crowns and also higher up on the aerial portions of branches. On the second plot inoculations were made immediately above and below the crown only, while on the third plot only the upper portions of stems were treated with no inoculations made near the crowns.

On June 4 a thorough examination of these plots was made. The following facts were observed:

1. The plots having inoculations near the crown showed far better results than the one having only upper stem injections.

2. There was much evidence that the killing action was still taking place.

3. There was nothing yet to indicate that roots would be killed.

4. Apparently all stems on which inoculations were made were killed outward from the point of treatment.

5. Since toxic action is still under way, it is too early to predict with any degree of conviction what the final results will be. Results to date, however, are very encouraging.

SURVIVAL OF FOUR SPECIES OF 5-NEEDLED PINES PLANTED AT CHEEKYE, B.C.

H. N. Putnam

In October, 1930 there were planted at Cheekye 1,000 each of Pinus lambertiana, P. monticola, P. flexilis and P. strobus. The trees were 2-2 planting stock from Wind River Nursery, Washington. They were in excellent condition for planting, having strong roots. Planting conditions were excellent. The ground was moist and frequent rains fell during and following the planting. The trees were planted with a regulation Forest Service planting tool after being well puddled.

The purpose of planting these four species was to study their relative susceptibility to blister rust, and for this purpose trees were planted in 28 small groups, each group usually consisting of 40 trees of each species spaced 3.3 by 3.3 feet. Thus each planting unit presented fairly uniform planting conditions.

On May 20, 1931 eight of these units were examined for survival. The following table shows the results of the check on survival:

SURVIVAL ON MAY 20, 1931 OF FOUR SPECIES OF PINES PLANTED IN OCTOBER, 1930.
CHEEKYE, BRITISH COLUMBIA

Plot	P. lambertiana			P. monticola			P. flexilis			P. strobus			Total Pines		
	Planted	Sur-vived	% Sur-vival	Planted	Sur-vived	% Sur-vival	Planted	Sur-vived	% Sur-vival	Planted	Sur-vived	% Sur-vival	Planted	Sur-vived	% Sur-vival
Caribou Trail	35	8	22.9	40	37	92.5	19	19	100.0	25	22	88.0	119	86	72.3
N-20 ch.	40	18	45.0	40	29	72.5	40	36	90.0	40	33	82.5	160	116	72.5
N-15 ch.	40	12	30.0	40	31	77.5	40	40	100.0	40	40	100.0	160	123	76.9
N-10 ch.	40	2	5.0	40	33	82.5	40	39	97.5	40	40	100.0	160	114	71.3
N-2 ch.	10	5	50.0	10	7	70.0	10	10	100.0	10	10	100.0	40	32	80.0
W-2 ch.	10	5	50.0	10	10	100.0	10	10	100.0	10	10	100.0	40	35	87.5
W-10 ch.	40	11	37.5	40	30	75.0	40	37	92.5	40	27	67.5	160	105	65.6
W-15 ch.	40	9	22.5	40	36	90.0	40	40	100.0	40	40	100.0	160	125	78.1
Total	255	70	27.5	260	213	81.9	239	231	96.7	245	222	90.6	999	736	73.7

It may be observed from the table that P. lambertiana uniformly showed a much lower per cent survival than did the other tree species. In no case was the survival of P. lambertiana greater than 50 per cent and the average was only 27.5 per cent. On the other hand P. flexilis showed a very high degree of survival, falling in no case below 90 per cent and in five of the eight plots showing no loss over the winter. It may be observed that in the case of the W-10-chain plot the survival of the eastern white pine was only 67.5 per cent. In this particular plot the planting conditions for the P. strobus were rocky and poorer than for the other three species. That planting conditions on the eight plots studied were fairly uniform may be observed. The per cent of survival, by plots rather than by species, on the eight plots varied only from 65.6 to 87.5 per cent. Since planting conditions were fairly uniform it is believed that the results in this study of survival are probably quite indicative of the relative ability of the forest pine species under consideration to survive. It is apparent that P. lambertiana is a very difficult tree to transplant in the Northwest. It is probable that to obtain a good survival of planted sugar pine it would be necessary to plant each tree in a ball of earth around the roots.

WHAT WOULD YOU DO? *

C. C. Strong

1. Supposing you were assigned the task of removing Ribes from all the stream type within the Inland Empire white pine belt and that you had proceeded using the two commonly accepted methods, i.e., hand pulling and spraying. Supposing further, that you had already completely worked a large area and had also re-worked it. Two or three years following the re-working you find the area so re-inhabited by Ribes seedlings that you fear leaving them for several years longer would result in the undoing of what good had already been accomplished. What would you do and when would you do it?

2. A great deal of the R. petiolare to be removed from white pine areas in the Inland Empire literally floats on the surfaces of meandering streams with its roots under water most of the year. Under these conditions it has proven most difficult if not impossible, to effect a satisfactory kill of these bushes with one or even two sprayings. In fact, one such area has had the bushes treated three times and still they grow vigorously. Supposing you were given the task of killing R. petiolare under the above conditions with one treatment. What would you do?

For a satisfactory solution to the above problems the author offers a big fat gooseberry pie and a pint of black currant jam.

*With apologies to "Liberty".

UREDINIA ON RIBES LACUSTRE AT NEWMAN LAKE

E. L. Joy

An abundance of uredinial infection on Ribes lacustre in the vicinity of heavily infected pines on the Newman Lake Plot was found on

June 4. It is very probable that the spots have been visible for a week or ten days as they are large and well developed.

A pre-season sampling of the infection on this plot was made May 6 when the cankers on 5 representative trees were analyzed. (See May issue, News Letter, P. 44). This analysis showed 202 fruiting cankers in 1931, an increase of 138 per cent over the number found on the same trees in 1930.

This large increase in the number of fruiting cankers, coupled with the fact that about one-third of the cankers found this year are fruiting the second time, will undoubtedly give a volume of aecia sufficient to infect the R. lacustre leaves of adjacent bushes with a "peak load." By the end of the 1931 season we should have much valuable information on the infection capacity of R. lacustre and the maximum distance the disease will spread to this species under conditions similar to those on the Newman Lake Plot.

"SPIRITS"

L. N. Goodding

The "Spirits" once told Conan Doyle that London was to settle into the briny deep within a few years. The spirits seem to be telling our Blister Rusters a good many things and leading to a good many "conservative" estimates about Blister Rust in 1931. Chicken Little was hit on the head by a rose petal and ran about telling his friends that the sky was falling in. By just a little conservative figuring we can readily see that by 1940 the volume of aeciospores produced in north Idaho will be so great that the atmosphere will become clouded with the spores. This will result in lowering the mean annual temperature two or three degrees. The heavy precipitation and cold following will cause a glacial epoch.

The bony hand in our nightmare of today will disappear when we awake several years hence and look back on the picture. After we have done all that we can we will probably find that nature has done more. We will find that we were reckoning without the hosts of Elisha. The only one who will find the picture dark will be the lazy optimist who expected nature to turn the whole trick for him.

That I may be guilty with the rest I wish to paint a picture. Some of the Western Blister Rust News Letter readers know something of the wind storm that raised such havoc April 21 and 22. Thousands of tons of dirt from the Palouse wheat fields and elsewhere were carried over western Washington and Oregon and on out to sea several hundred miles. Forests were laid low, fires swept the mountains, - Oh well it was one heck of a storm and no mistake. Withal there was a very unsavory coincidence. Blister rust cankers were in the height of aecial production and the winds swept through the heaviest infection areas in some places 50 miles or more per hour. After the spores were well distributed over thousands of square miles a gentle north and northwest wind carried them down to southern Oregon and California. Enough said. - If George does not find blister rust in California this year it will be because he tackled the scouting with Frank Patty on horse-back or the whole country dries up.

CAMP LOCATIONS AND SUPERVISION

Clearwater National Forest
Operation Supervised by Paul Gerrard, Forest Service,
and H. E. Swanson, Blister Rust Control

Camp No.	Camp Boss	Division Supervisor	Location
1	Jim Thaanum	F. O. Walters	Eldorado Ranger Station, NE Corner T34N., R6E.
2	Lee K. Moore	"	Junction North Fork Lolo & East Fork Lolo Creek
3	Webster Sterba	"	Camp Creek, Sec. 31, T36N., R7E.
4	Blaine Snyder	"	Musselshell Creek, between Secs. 23 & 24, T36N., R6E.
5	H. L. Cupp	N. B. Nelson	Junction Rosebud & Orofino Creeks
6	Virgil Evans	"	Upper French Creek, NW Corner Sec. 37, T35N., R6E.
7	L. C. Gwen	"	South Fork French Creek on township line between R. 6 & 7
8	Fred Merritt	"	Junction South & East Fork of French Creek
9	Richard Cannon	"	Junction East Fork and French Creek
10	C. O. Peterson	C. O. Peterson	Junction Hemlock and Wates Creeks
11	Otto Luke	"	Junction Bighorn and Wates Creeks
12	L. M. Strong	Virgil Moss	Pine Creek 1/2 mile south Orogrande
13	James Black	"	Orogrande, 1/2 mile west mouth Cottonwood Creek
14	H. F. Furrow	"	Orogrande 1/2 mile south Bungalow
15	R. L. Wolcott	Fred Heinrich	Sec. 31, T39N., R7E.
16	Eric Anderson	"	SW Corner Sec. 20, T39N., R7E
17	E. T. Becher	"	North Fork Clearwater SE Corner Sec. 22, T39N., R7E
18	Harry Faulkner	"	Mouth Eagle Creek, Sec. 1, T39N., R7E
19	Arthur Mayer	"	Mouth Larson Creek, Sec. 32, T40N., R8E
20	Fritz Hedman	F. O. Walters	Cleanup Camp, Eldorado Creek west of Cedars Lookout
Methods	Elston Wyckoff	---	Orogrande NW Corner Sec. 5, T37N., R7E

Clearwater Timber Protective Association
B. A. Anderson in charge, L. L. White, Assistant
Headquarters, Camp #4

Camp No.	Camp Boss	Location of Camp
* 1	Fred Crosetto	Rhodes Creek NW Corner T36N., R. 6 E.
2	Robert Trego	Junction Rhodes and Orofino Creeks
3	S.L. MacLaughlin	Orofino Creek On line between Rs. 5 & 6 E., T36N.
* 4	L. H. Stauffer	Shanghai Creek Sec. 19, T37N., R. 6 E.
* 5	Paul Parks	Breakfast Creek Sec. 4, T37N., R. 6 E.
6	Wm. Schakohl	Junction Crystal and Orogrande Creeks
7	B. T. Onstat	Canal Gulch Creek Sec. 23, T37N., R. 5 E.
* 8	Stanley Lien	Trail Creek Sec. 10, T37N., R. 5 E.
9	Paul Anderson	Cleanup

*Camps with phones.

Potlatch Timber Protective Association
W. G. Guernsey in charge, Ed. Lundberg, Assistant
Headquarters, Camp #1

Camp No.	Camp Boss	Location of Camp
1	Merrill Oaks	Cameron Creek Sec. 30, T40N., R. 2 E.
2	Holt Fritchman	Falls on Elk Creek Sec. 11, T39N., R. 2 E.
3	Rudolph Anderson	Green Mountains NE Corner, T40N., R. 3 E.
4	Roy Lundberg	Stony Creek 1 mi. north Hemlock Butte, T41N., R2E

Clarkia, Idaho
W. G. Guernsey in charge, H. F. Geil, Assistant
Headquarters, Camp #1

Camp No.	Camp Boss	Location of Camp
1	Don Williams	Near Clarkia Sec. 9, T42N., R. 2 E.
2	Albert Pence	Near Clarkia Sec. 11, T42N., R. 2 E.

Priest Lake, Idaho
H. Hartman in charge
Headquarters, Camp #1

Camp No.	Camp Boss	Location of Camp
1	John Stobie	Lower North Fork East River Fischer's Cabin
2	Donald Moore	Upper North Fork East River above Junta Creek

California Operations

Experimental Ribes Eradication, California,
W. V. Benedict in charge, D. R. Miller, Assistant.

Two camps, located on the Deer Creek drainage, Lassen National Forest, Milton Hand and Eugene Kincaid, camp bosses.

* * * *

Control Reconnaissance, California,
T. H. Harris in charge.

Work located in the sugar pine type of the Klamath National Forest.

NOTES

H. M. Cowling left June 12 for the annual encampment of the Washington National Guards at Fort Lewis, Washington.

* * *

C. M. Chapman, Fred Staat and H. N. Putnam left June 14 to assist Goodding on the Oregon work.

* * *

The editor departed for California June 14 to secure pictures of the eradication and reconnaissance operations there. He will also visit Riley's camp at Mount Rainier National Park before returning to Spokane.

AND ALL WERE MADE OF WOOD

The ships hard fought by John Paul Jones,
  The rails that Lincoln split;
Brave Freedom's huts at Valley Forge,
  The synonym of grit;
Mount Vernon's halls and columned porch
  Where Washington once stood;
America these mean to us,
  And all were made of wood.

The musket butt the Minute Men
  Pressed hard to sturdy shoulder;
The high stockade at Dan Boone's fort
  That thwarted redskin murder;
The ramrod Molly Pitcher snatched,
  All red with royal blood;
America these mean to us
  And they were made of wood.

The staff that held Fort Moultrie's flag,
  By gallant Jasper raised;
Bold Perry's fleet from forest hewed,
  That doomed a foe amazed;
The wagon trails that won the West
  And every fear withstood;
America they mean to us,
  And they were made of wood.

The pines that clothe the southern plains,
  The big trees of the West;
The Douglas fir on Cascade slopes,
  The spruce o' the Rockies' crest;
The white pine of New England's hills,
  The hemlocks on Mount Hood;
America these mean to us,
  Price, beauty, wealth, in wood.

--L. C. Everard.

The above poem was taken from a recent issue of the Pacific Rural Press. Though not directly linked with blister rust, there is a source of inspiration involved as to the value of wood and a trend of thought for its conservation. We can keep this in mind in the blister rust protection of white pines. G. A. Root.

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W E S T E R N B L I S T E R R U S T

N E W S L E T T E R

* * *

Summer Issue No. 2

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U. S. Department of Agriculture
Bureau of Plant Industry
Western Office, Division of Blister Rust Control
Spokane, Washington

EXPERIMENTAL APPLICATION OF OIL TO CALIFORNIA RIBES

W. V. Benedict

Last season on the Stanislaus National Forest experiments were undertaken with Diesel oil, pitch oil, kerosene, gasoline and combinations of these oils to test their toxic effect on Ribes roezli. The oils were applied to the bushes in the following ways: as a spray to the leaves (both upper and lower surfaces) and stems, as a spray to the lacerated stems, as a spray to the exposed crown after the stems had been cut away, by pouring a quantity of oil in the soil around the base of the plant, and as an injection into the stems and crown.

An examination this year of these experimental areas showed that:

(1) Straight Diesel oil, applied as a spray to the leaves and stems of the plant resulted in practically a 100% live stem kill and 80% or better bush kill. Failure of complete bush kill might have been due to improper application of Diesel oil to the entire plant.

(2) The addition of any of the other oils with Diesel oil lowered the effectiveness of Diesel oil.

(3) The results of the other oils and other methods of application were not encouraging.

In light of the promising results obtained from Diesel oil as a spray to leaves and stems its experimental use is being continued this season on the Lassen National Forest on a larger scale. Tests are being made on R. roezli, R. inerme and R. nevadense. The results of this season's work should show conclusively whether or not Diesel oil is destined to play a role in the California Ribes eradication program. Just how important this role might be will later be determined by comparative oil application and hand pulling experiments.

ERADICATE RIBES AT STILL CREEK

Final efforts to protect from blister rust the young western white pine on the Still Creek planting area near Swim, Oregon, were launched July 15 when a 10-man camp under the supervision of Tom B. Onstot was established.

A survey of the conditions on the Still Creek area was made earlier in the year under the direction of H. N. Putnam and disclosed that adequate protection had not been given the pines. The survey also showed that blister rust cankers are now scattered throughout the plantations and a few miles away a pine infection center exists containing thousands of cankers.

The check of the areas on which eradicative efforts have been concentrated showed that sufficient Ribes remained to defeat the protective efforts unless more work was done at once.

Mr. Onstot is in charge of the work and has as crew foremen Ralph Carlson and Tom Mus, all of whom were formerly on Ribes eradication work on the

Clearwater Timber Protective Association. Seven laborers were hired in Oregon.

The job consists of spraying Ribes bracteosum and hand pulling R. lacustre on 120 acres of stream type and hand pulling R. lacustre and R. sanguineum on 515 acres of upland type. The R. bracteosum is being worked by spraying the aerial parts and the ground around the crown of the bush with Atlacide mixed 1.4 pounds to a gallon of water.

All of the stream type on the area will be worked this season but only the upland type previously unworked will be covered.

L. N. Goodding, who has had charge of the work at Still Creek in former years is concentrating all his efforts on timber reconnaissance in southern Oregon this season, making it necessary to move a man from the Idaho unit to supervise the 1931 work.

R. L. MacLeod spent a week assisting Mr. Onstot in securing equipment and getting the work started. It is estimated that the eradication work will be finished by September 15.

FIND NEW CENTERS OF PINE INFECTION IN IDAHO

Scouting work during the last month has brought to light 24 new centers of blister rust infection on pines in Idaho according to E. L. Joy who is supervising the work. Eighteen of these centers are on the St. Joe National Forest, five are on the Potlatch Timber Protective Association and one is on the Clearwater Timber Protective Association.

Of the 18 centers located on the St. Joe National Forest all except one are small, containing from one to seven infected trees. The other one covers approximately 100 acres along Fishhook Creek. There are about 250 pines per acre, 50 to 75 per cent of which are infected. Thousands of cankers are present. Four species of Ribes occur on the area, all of which are quite heavily infected. The infection originated in 1923 or earlier.

One large center and four small ones occur on the Potlatch Timber Protective Association. The large one is on Ruby Creek and the East Fork of Potlatch Creek and is 5½ miles long. Here about 10 per cent of the pines are infected and cankers are abundant. This infection is also of 1923 origin.

The new infection on the Clearwater Timber Protective Association is on Deer Creek and extends for 60 chains. Of 500 pines examined, 166 were infected. This center originated in 1923 or 1924.

Four of the 24 centers originated in 1923 or earlier, one in 1926, 18 in 1927 and one in 1928. The following tabulations show all infections found so far this season:

ST. JOE NATIONAL FOREST
Avery, Slate Creek and Ward's Peak Districts

Location	Date	T.	R.	S.	No.Pines Exam.	No.Pines Inf.	Cankers	Prob. Year Origin	Ribes Species	Ribes Exam.	Ribes Inf.
Kyle Ck. Trib. of N.Fk.St. Joe River	7/9 31	46N	5E	13	200	1	1-1926 F. Pyc.	1927	R.pet. R.lac. R.visc.	50 10 10	0 0 0
Main St. Joe R. 8.5 to 8.8 mi. above Avery 2 centers	7/20 31	45N	6E	22 23	300	3	1-1927 F. Pyc. 2-1926 Juv. 2-1926 F. Pyc. 1-1925 F. Pyc.	1927	R.visc. R.irrig. R.lac.	50 25 10	0 0 0
Bird Ck. Trib. of Main St. Joe R., 11 mi. above Avery	7/20 31	45N	6E	13	50	1	1-1925 Pyc. Sc.	1927	R.pet. R.irrig. R.visc. R.lac.	10 5 5 5	0 0 0 0
* Fishhook Ck.trib.of Main St. Joe R. for 2 mi.above mouth	7/18 7/19 31	45N	5E	17 20 32	200	7	1-1927 F. Pyc. 1-1926 F. Pyc. 2-1926 Pyc.Sc. 1-1926 Fr. 1 1-1925 Fr. 2 1-1924 Fr. 2	1927	R.irrig. R.visc. R.lac.	50 50 10	0 1 1
Loop Ck.at mouth of Kelly and Turkey Cks.	7/16 31	46N	7E	18	100	1	1-1926 Pyc.Sc.	1927	R.pet. R.visc. R.lac.	25 0 5	0 0 0
Loop Ck.at mouth of Brushy Ck.	7/16 31	46N	6E	12	100	1	1-1926 Pyc.Sc.	1927	R.pet. R.visc. R.lac.	25 0 5	0 0 0
Loop Ck. 5 ch. below mouth Frazier Ck.	7/17 31	46N	6E	4	200	1	1-1927 Fr. 1	1927	R.pet. R.lac. R.visc. R. iner.	50 10 0 0	0 0 0 0
** Hammond Ck. Trib.N.Fk. St.Joe R.	6/28 31	46N	5E	25	300	1	1-1926 F. Pyc.	1927	R.pet. R.lac. R.visc.	50 20 5	0 0 0
Railroad Ck.Trib.of Little N. Fk.St.Joe River	6/29 31	47N	5E	28	200	2	1-1926 Pyc.Sc. 1-1925 Fr. 1	1927	R.pet. R.lac. R.visc.	50 20 10	0 0 0
Champion Ck. Trib. Little N. Fk.	6/30 31	47N	5E	27	200	3	1-1927 Fr. 1 2-1927 Fr. 2 1-1926 Fr. 1 1-1926 Fr. 2	1927	R.pet. R.lac. R.visc.	50 20 20	2 0 0

*Incomplete.
**Infection found at this point in 1930.

ST. JOE NATIONAL FOREST
Avery, Slate Creek and Ward's Peak Districts
(Continued)

Location	Date	T.	R.	S.	No. Pines Exam.	No. Pines Inf.	Cankers	Prob. Year Origin	Ribes Species	Ribes Exam.	Ribes Inf.
Little N. Fk. St. Joe R. above mouth Loop Ck.	7/13 31	46N	6E	6	350	3	2-1926 Pyc. Sc. 1-1925 Fr. 1	1927	R. pet. R. lac. R. iner. R. visc.	100 30 50 10	0 0 0 0
Lucky Swede Ck. Trib. of Little N. Fk. St. Joe River	7/1 31	46N	6E	6	200	2	1-1926 Pyc. Sc. 1-1925 Pyc. Sc.	1927	R. pet. R. irrig. R. lac. R. visc.	100 10 20 10	0 0 0 0
No-Name Ck. Trib. Little N. Fk. St. Joe River	7/7 31	47N	5E	34	100	1	1-1928 Juv.	1928	R. pet. R. lac. R. visc.	50 10 10	0 0 0
Turkey Ck. Trib. of Loop Ck.	7/14 31	46N	7E	18	100	1	1-1926 Pyc. Sc.	1927	R. pet. R. visc. R. lac.	30 20 10	0 0 0
Ward Ck. Trib. of Loop Ck.	7/14 31	46N	7E	20	100	1	1-1925 Fr. 1	1927	R. pet. R. visc. R. lac.	50 10 10	0 0 0
** Kelly Ck. Trib. of Loop Ck.	7/15 31	46N	7E	7	150	1	1-1924 Fr. 2	1926	R. pet. R. visc. R. lac.	50 10 10	0 0 0
# Cliff Ck. Trib. to Loop Ck.	7/17 31	47N	6E	35	300	6	1-1927 F. Pyc. 1-1926 F. Pyc. 2-1926 Pyc. Sc. 2-1926 Fr. 1 1-1926 Fr. 2 1-1925 Pyc. Sc. 1-1924 Fr. 1	1927	R. pet. R. visc. R. lac.	50 50 30	10 10 10
Fishhook Ck. 5 to 6-1/4 mi. from mouth	7/22 & 7/23 31	44N	5E	4,5 8,9	Inf. 100 acres ave. 250 pines per acre 50-75% pines in fected		Thousands	1923 or earlier	R. pet. (L) R. visc. (L) R. irrig. (L) R. lac. (M)	All species of Ribes on the area are quite heavily infected	
Slate Ck. 2 miles below Ranger Station	7/24 31	46N	4E	1	150	1	1-1926 Fr. 1	1927	R. pet. R. visc. R. irrig. R. lac.	30 10 10 10	0 0 0 0

***Canker did not fruit in 1931. Probably in 1930 and 1929.
All Ribes within 1 ch. each way of fruiting canker were heavily infected.

POTLATCH TIMBER PROTECTIVE ASSOCIATION

	Location	Date	T.	R.	S.	No.Pines Exam.	No.Pines Inf.	Cankers	Prob. Year Origin	Ribes Species	Ribes Exam.	Ribes Inf.
*	Robs Ck. Trib. of E. Fk. Potlatch Ck. 2 mi. from mouth	7/2 31	41N	1E	22	300	1	1-1926 Fr. 2	1927	R.pet. R.lac.	0 0	0 0
**	E. Fk. Potlatch Ck. 7 to 7.8 mi.E. of Bovill	7/3 31	41N	1E	25	200	3	2-1926 F. Pyc. 1-1923 Fr.Sev.	1923	R.pet. R.iner. R.lac.	0 0 0	0 0 0
***	Ruby Ck. E. Fk.Potlatch Ck. 4 mi. up Ruby Ck.from mouth to 1½ mi. below mouth on E. Fk.Potlatch Ck.	7/4 7/6 31	40N	1E 1W	18 17 16 15 22 13	200	Approx. 10% in 5½ mi.	Very abundant.	1923	R.pet. R.visc. R.lac. R.iner.	? ? ? ?	50% of all bushes in 5½ mi.
#	Elk Ck. 22 mi.above Elk River, Ida.	7/5 31	40N	2E	14	25	2	1-1926 Pyc.Sc. 1-1926 Fr. 1	1927	R.iner. R.visc. R.lac.	0 0 0	0 0 0
##	Bull Run Ck. 28 chains below falls	7/17 31	40N	2E	10	50	2	3-1926 F. Pyc. 1-1926 Fr. 1	1927	R.pet. R.lac.	0 0	0 0

CLEARWATER TIMBER PROTECTIVE ASSOCIATION

###	Deer Ck. above mouth for 60 ch.	7/13 7/14 31	38N	5E	23 26	500	166	310 cankers from 1929 Juv. to 1920 Fr. Sev.	1923 or 1924	R.pet. R.visc. R.lac.	0 0 0	0 0 0

*Erad. work done 1928.
**Erad. work done 1928 and 1929.
***No erad. work done.
#Erad. work done 1930.
##Erad. work done 1930 and 1931.
###Erad. 1929 - Re-erad. 1931.

OREGON NOTES

L. N. Goodding

"Hope springs eternal in the human breast". Perhaps some of us were hoping that certain Ribes in southern Oregon and adjacent California would prove immume or at least resistant to blister rust. If we were thus nourishing hopes we have at least three disillusionments in the Ribes garden at Rhododendron, Oregon. On June 15, Putnam, Chapman, Staat and Goodding inspected the bushes planted there last fall. While these were intended for inoculation experiments none of this work had been done. Natural spread, however, had caught R. klamathense, R. marshallii and R. binominatum, all of which species are associated with sugar pine in southern Oregon. In fact the reconnaissance being carried on at present is revealing the last two of these to be extremely abundant in the Siskiyou Mountains in the best stands of sugar pine. It is too early in the season to say what action blister rust will take on R. hallii (call it smooth fruited R. viscosissimum if you wish), R. velutinum, R. erythrocarpum and R. nevadense.

Fred Joy and three fellow foresters, Tiedemann, Wessela and Wheeler are doing reconnaissance work in southern Oregon. Joy complains that Idaho conditions are reversed. Stream type Ribes, except for R. lacustre in places, are conspicuous by their absence, while the slopes and ridges are covered with them. Even R. lacustre doesn't stay put but covers entire slopes at higher altitudes. There are fields of R. marshallii, R. binominatum, R. hallii and R. lacustre. Unfortunately the sugar pine likewise hangs to the ridges and higher slopes.

Steve Coleman and Richard Barss are at work making a good eradication job at Wind River better.

A STUDY OF THE ACCURACY OF OCULAR ESTIMATES OF FEET OF NEEDLE-BEARING STEM OF WESTERN WHITE PINE

H. N. Putnam

In determining the intensity of infection on the pines it is important that the pine foliage be expressed in some even sized and readily ascertainable unit in order that different infections may be compared on the same basis. The unit adopted in the West is linear feet of needle-bearing stem. The number of feet of needle-bearing stem has for the most part been determined from ocular estimates on each tree.

There has been little opportunity to determine the actual accuracy of these ocular estimates. At Newman Lake this spring a course of training was given new men in their prospective work of studying pine infection. During the course of this training individual estimates were made of the feet of needle-bearing stem of selected trees of different sizes. The estimates of each man were kept separate and after all estimates were made the tree in question was hastily gone over with a foot ruler and rough measurements made of the feet of needle-bearing stem.

The usual method employed in making an ocular estimate of the needle-bearing stem of a tree is to pick out by eye the average whorl and estimate the

feet of needle-bearing stem on this average whorl. The estimated feet of needle stem on the whorl is then multiplied by the number of whorls and the result is the estimated feet of needle stem for the tree.

This paper constitutes a summary of the ocular estimates compared to the actual measurements of 7 pine trees studied by 8 individuals.

In Table No. 1 there is shown the comparisons of the average feet of needle stem as estimated for each tree and the actual rough measurement of the tree.

TABLE NO. 1

COMPARISONS OF ACTUAL ROUGH MEASUREMENTS OF FEET OF NEEDLE STEM OF SEVEN P. MONTICOLA TREES AT NEWMAN LAKE WITH OCULAR ESTIMATES OF THE SAME TREES BY EIGHT INDIVIDUALS - JUNE, 1931

Tree No.	Actual Rough Measurement (F.N.S.)	Average of 8 Estimates of F.N.S.	Standard Deviation % Estimates ± - F.N.S.	Coefficient of Variation (Per Cents)	Per Cent Error
1	31	34	9	26	+ 10
2	140	146	51	35	+ 4
3	210	345	58	17	+ 61
4	325	288	37	13	- 11
5	675	655	98	15	- 3
6	700	622	159	26	- 11
7	1,600	1,366	313	23	- 15
Totals or Ave.	3,681	3,456			- 6

The standard deviation of estimates is simply a further definition of the average. It represents that plus or minus quantity of feet of needle stem within which range of the average 2/3 of the observations would fall. It represents the "scatteration" around the average. For instance, in estimating the feet of needle stem of tree No. 1, 2/3 of all estimates would fall within a range of 25 to 43 feet of needle stem with an average estimate of 34 feet of needle stem. The coefficient of variation is simply the relationship of the standard deviation and the average estimate expressed as a per cent.

The per cent error represents the relation of the average estimate to the actual rough measurement of a given tree.

It may be observed that there is a tendency to overestimate the feet of needle stem on small trees and to underestimate the feet of needle stem on larger trees.

With the exception of tree No. 3, which has a per cent error of 61 per cent, the per cent errors were not great, ranging from minus 3 per cent to minus 15 per cent. There is an average of only minus 6 per cent error on 7 trees studied.

Attention is directed to the low coefficient variation and the high per cent error, 61 per cent, in estimating the foliage of tree No. 3. This fact

indicates that all of the 8 men made very similar estimates but that for some reason all of them guessed very high.

With the exception of estimates on tree No. 3 the estimates on the other 6 trees were all within the allowable per cent error in this type of work.

In Table No. 2 there areshown the estimates of each of the 8 men on the combined foliage of the 7 trees studied compared to the actual measurements of the feet of needle stem of the 7 trees. Two of these men had had considerable experience in estimating feet of needle stem in previous years. The other 6 men had had practically no such experience. The value of training in estimating foliage is brought out in Table No. 2. The per cent of error of the two experienced men was less than that of any of the others. Although two of the new men had only a small per cent error in their estimates there was a wide variation in the estimates of the other four men. The method of training in the use of judgment of quantities whereby ocular estimates are immediately checked against actual measurements, however, rough, is of great value in forming correct conceptions of quantities. Weaknesses in making such estimates are at once apparent and can be corrected.

TABLE NO. 2

ACCURACY OF INDIVIDUAL ESTIMATES OF TOTAL FEET OF NEEDLE STEM OF SEVEN P.MONTICOLA TREES, NEWMAN LAKE, WASHINGTON, JUNE, 1931

Estimator	Total Feet of Needle Stem of 7 Pines Studied		Per Cent Error
	Actual Rough Measurement	Estimate of Individual	
A. Experienced	3,681	3,726	+ 1.2
B. "	3,681	3,685	+ 0.1
C. Not Experienced	3,681	3,065	-16.7
D. " "	3,681	2,895	-21.4
E. " "	3,681	4,238	+15.1
F. " "	3,681	2,668	-27.5
G. " "	3,681	3,615	- 1.8
H. " "	3,681	3,760	+ 2.1
Averages	3,681	3,456	- 6.1

RIBES ERADICATION IN THE PRIEST LAKE REGION

Homer Hartman

The Priest Lake region is again a scene of blister rust control activities for the first time since eradication work was done on the Big Creek drainage in 1928.

This year the control work is being carried on in the North Fork of East River drainage by two 20-man units. A complete Ribes eradication job is being done; hillsides as well as stream type are being covered. Ribes lacustre and R. viscosissimum are found in medium concentrations throughout the area. A

heavy concentration of R. inerme is found in the stream type near the mouth of the stream.

Hand eradication methods studies are being conducted in both camps, as outlined by H. E. Swanson. The primary objective of all methods work is to reduce cost and increase the efficiency of Ribes eradication work. The purpose behind the experiments which are being conducted at present is chiefly that of increasing the efficiency of the work. It is the wish that a better job can be performed at the time of initial Ribes eradication in order to give the very best possible protection. The experiment is designed to improve the efficiency of the work at a minimum cost by reducing the amount of live stem left on an area to a protective standard.

In general, all the experiments being conducted will come under one classification, namely, the relation of cost to efficiency. They will show the cost of work necessary to secure various degrees of efficiency measured in terms of number of feet of live stem left on the area.

The methods men are engaged entirely in reworking areas worked by the regular Ribes eradication crews. Strips originally worked by the regular crews are reworked by the methods men in one, two and three-man crews. Some of the areas worked as stated above are reworked the second time in cases of extremely heavy concentrations in order to reduce the live stem on the area to a very low figure.

As a means to determine the efficiency of the reworkings, a final check is made on all areas reworked by the methods crew. Careful records are kept on all parts of the experiment.

An additional experiment is being run by the methods crew in Camp No. 1 on R. inerme on the North Fork. This involves the spraying of the R. inerme with different solutions of Atlacide and sodium chlorate. A heavy application is applied to the ground representing the root distribution, as well as the leaf surface. This plot includes about 15 acres.

This area will be resprayed several times during the summer if a sufficient amount of resprouting is present to render it necessary.

INSPECT FOREST SERVICE BLISTER RUST CONTROL OPERATIONS

J. A. Fitzwater of the Forest Service at Washington, D. C., Elers Koch, Assistant Regional Forester, Region 1, Missoula, Montana and C. C. Strong left Spokane July 6 on an inspection tour of the Blister Rust Control operations on the Clearwater National Forest. H. E. Swanson and Paul Gerrard joined the party at Pierce, Idaho.

Most of the camps were visited and some of the areas to be worked next year were inspected. The tour came to a halt July 10 when the Hemlock fire broke out.

CLEARWATER NATIONAL FOREST RIBES ERADICATION UNIT NO. 2

Neal Nelson

Ribes eradication in the Clearwater National Forest has been divided into five units, consisting of nineteen eradication camps, one methods camp, and one cleanup camp. Since Unit No. 2 is under my supervision, allow me to present our problems, hopes and despairs.

Unit No. 2 consists of camps 5, 6, 7, 8 and 9, each having problems or areas to be worked somewhat different from the others.

Let us first consider the area to be worked by Camp No. 5, under the supervision of Horace L. Cupp. Camp No. 5 is situated in the upper part, or near the head of the Orofino Creek drainage. This area was attacked by gold miners sometime between the 60's and 1900; as a consequence the creek has been turned upside down several times and we find R. petiolare and R. lacustre pretty well scattered, which necessitates considerable dodging around in order to obtain an efficient Ribes eradication job. The work to be done in the area is largely stream type, as the timber on the sidehills is for the most part open pole with an overstory of open mature, the rest being dense and open reproduction. However, on the ridge tops we have several large burns which have grown back to many different species of brush and which also contain many R. viscosissimum as well as a few R. lacustre. Eradication on these areas is made difficult by the size of R. viscosissimum, the brush and the numerous windfalls. There are also several old miners' trails and ditches which have a considerable Ribes growth consisting of R. viscosissimum and R. lacustre along the trails, and R. petiolare and R. lacustre along the ditches.

Camp No. 6, under the supervision of Virgil Evans, is located on the headwaters of French Creek. Here again the country has been torn asunder by gold-mad men and Chinamen, but instead of having a uniform growth of timber as we have in the Camp No. 5 area, we have a large part of the area spotted with new growth. In some places the open spaces are filled with thick brush where there may or may not be Ribes, and other places where there is no timber we have very little brush and some R. lacustre. In this camp area very little R. viscosissimum is found. Even on the ridge tops and burns we have R. lacustre in great numbers but very few R. viscosissimum. R. petiolare is found growing along the main streams and even follows up the small tributaries going up into the seepages near the ridge tops and in such numbers as to necessitate the spraying of these bushes. However, there are numerous old trails made by miners in the olden days and with very little work these old trails have been cleared so that pack stock can carry the chemical to such places as it is needed. Part of this area is being grazed by sheep so at present it is a game to see whether we will get the Ribes or whether the sheep will strip the leaves before we get to them. The sheep are also pretty thoughtful about scattering the string lines hither and thither. Camp No. 6 will not have to worry about moving this summer for they have just plenty of work to keep them very busy all summer.

Camp No. 7, under the supervision of John Gynn, is located just over the ridge to the east of the Camp No. 6 area. This area consists of the head-

waters of the South Fork of the East Fork of French Creek. This area does not have much of a stand of timber on it. However, there is some reproduction; it is an old burn to a large extent and the hillsides and ridge tops have a fine stand of alder to say nothing of other kinds of brush. These large alder patches that are prevalent do not have any consistency as to Ribes content. In some alder patches R. lacustre is found in abundance while in others very few Ribes are found, so that the camp boss has much scouting to do and many decisions to make as to whether an area should be worked or not. In this camp area as in Camp No. 6, R. viscosissimum is very scarce, with R. lacustre predominating on the hillsides and ridge tops. Along the main streams we have R. petiolare growing and it also follows the small tributaries up the hillsides but not to the extent that it does in the Camp No. 6 area. This camp area too is blessed with sheep, so they have a double problem, especially with the sprayed bushes, as the sheep stand and wait for the bushes to be sprayed so that they may have salt on their food. The sheepherder cooperates as best he can but the sheep do not try to see things in the right light. Camp No. 7 also will have their hands full to finish their area by the end of the eradication season.

Camp No. 8, under the supervision of Fritz Merritt, is located near the forks of the East Fork of French Creek and the South Fork. Here the canyon is rather deep and the sidehills steep. This area, where there is timber, has a fine stand of pole timber which is largely white pine and as a whole is Ribes free. However, there is a burn which is about fifteen years old; at any rate the reproduction is about ten years old. This burn is literally overrun with R. lacustre. The burn covers about a section, possibly more, and will all have to be eradicated of Ribes, so Camp No. 8 will not have to go begging for something to do. Along the main streams R. lacustre and R. petiolare grow luxuriantly. Also we have a few scattering bushes of R. triste which does not help in the least when it comes to eradicating the Ribes in the stream type. R. triste is not a common species in this region, so consequently we were puzzled as to what it was, and what to do with it. As much as I would like to claim the honor of discovering this imposter of a Ribes, I shall have to admit that Fritz Merritt, the camp boss of No. 8, embarrassed me by asking me what manner of a Ribes it was. The Ribes in the Camp No.8 area consist of many feet of live stem. The number of bushes per acre may not exceed the number in the other camp areas, but the number of feet of live stem is much greater than any of the camp areas in Unit No. 2.

Camp No. 9 with Richard Cannon as camp boss, is located at the forks of French Creek and the East Fork of French Creek. Here the canyon walls are steep and in some cases rocky but for the most part covered with pole timber, which is almost Ribes free. The creeks are swift running and very rocky but are bordered with R. lacustre and some R. petiolare. The work in this camp area is largely stream type. However, on one edge of the area we have considerable hillside Ribes eradication but not to the degree that we have in the other camps of Unit No. 2. Camp No. 9 stands the best chance of any of the camps in the Unit of moving because of the fact that most of their work is stream type.

Taking the Unit as a whole we have a fine bunch of camp bosses and men. There is a fine spirit of cooperation, so everything is running smoothly. Each and every camp is sure that their area contains longer and steeper hills, larger and tougher Ribes and better cooks than any of the other camps, and I am sure that they are all right.

NOTE TO THE EDITOR

The following letter was received recently. Although the name of the writer remains unknown, I should deem it worthy recognition of the thought and effort he has given to this problem in the short time he has been connected with our work if space could be found to publish the letter. Although we realize that there are many of our employees who are constantly endeavoring to help solve numerous problems such concrete evidence as this letter typifies is distinctly gratifying. Lest we forget, many suggestions have been made by members of our temporary personnel, some of which have later crystallized into valuable and improved methods of working. Hats off to the unknown writer!

C. C. Strong

June, 1931

Mr. C. C. Strong

Dear Sir:

When you wrote the little article for the June News Letter "What Would You Do?", of course you did not expect it to be taken seriously. However, I am very fond of gooseberry pie and black currant jam though if you know where you can procure the black currants? Well I suppose it is possible.

The first evening after I read those three short paragraphs I thought I knew just what I should do. Oh yes, I'm a new recruit in the Blister Rusters and so I cannot see why my plan was not put into effect by some of the older heads in Washington, D.C. long ago, provided it is practical.

I realize the cost of keeping blister rust under control is tremendous. We are just beginning to learn how immense the job is. However, we've started seriously and are bound to win before we reduce our efforts.

You see I identify myself with the work, and whatever plans are decided on, will give all the support I'm capable of and believe you will find that sentiment or attitude universal among the Blister Rusters.

If we work a district thoroughly this year with a 25-man crew, next year one man should be able to scout that district, find the new seedlings and dispose of them. Perhaps he could even spray the stream area where that was necessary.

A man used to the work will pull five seedlings as quickly and easily as he will pull one 4-year-old plant and eliminate the chance of reseeding. If an area is patrolled the three succeeding years after this year's eradication program it will undoubtedly be as thoroughly cleaned as though left until 1934 and then reworked by a full crew, and that at much less expense.

It would be hard to find men who would do this work thoroughly and conscientiously but they can be found. The Department is in need of

that kind of men. Ten years from now there will be many more positions for men of this type and probably a great need for more of them. Every year our work in forest protection and reforestation is reaching larger proportions and requires more men with a thorough knowledge of the working conditions in their department. These men will be the captains and lieutenants of the organization ten years hence.

Up until now one can go into most areas worked three years ago and find enough Ribes to do considerable damage in case of infection. Next year one or two men could take the maps and records of any given area worked this year and accomplish as much toward control as ten men could in the same area three years from now. Although this year's work and experiments may develop entirely new methods of eradication work, much of the area worked up until now will undoubtedly have to be reworked.

I believe a patrol reworking a given area for three years would net results quite practical, like weeding the garden. It is much easier to weed the garden three times during the spring than to wait until summer and try to do it all in one operation, thereby producing some seeds to start a new crop of weeds next year.

As a new recruit I realize I am distinctly a novice in this work. Still if this did not go into the waste basket before now I beg consideration for my forwardness.

Sincerely,

A "Blister Ruster".

RELATION OF ALTERNATING TEMPERATURES TO RIBES ROEZLI GERMINATION

Frank A. Patty

Heretofore the seed of R. roezli has not been successfully germinated in the laboratory, in the greenhouse, or in outside plantings when the latter are very far removed from the native habitat. Studies conducted in the Stanislaus National Forest, however, have shown that this species has a fair germination percentage. In view of the fact that R. roezli is found growing over rather a wide range of soil conditions, it does not appear that the soil solutes alone are the important factors.

For this reason an experiment was outlined for the purpose of testing the effect of changing temperatures on the seeds of R. roezli. Three lots of seeds were given the following treatments: Lot 1 was stored at 18° C, lot 2 at 0° C, and lot 3 at 5° C, for a period of two months, after which time they were put in rooms of higher temperatures for a period of 8 hours and then returned to their original storage rooms. Lot 1 was placed in a $2\frac{1}{2}$° C room, lot 2 in a 5° C room, and lot 3 in a 10° C room. The alternation of the temperatures continued for seven days, but each day one-seventh of the seeds was taken out and planted. Thus, the seeds which were taken out the first day had been subjected to alternate temperatures once before planting; the ones which were taken out the second day were subjected to alternate

temperatures twice before planting, and so on until the seeds which were taken out the seventh day had received alternature temperatures seven times.

The following table shows the effect of alternating R. roezli seeds between 0° C and 5° C (lot 2) for one, two, three, four, five, six and seven days. The seeds in series A were collected in the fall of 1930 and stored in a paper bag in the laboratory for approximately five months; the ones in series B were collected in the fall of 1930, layered in sand, and stored in the greenhouse for approximately five months; and the ones in series C were collected in 1929 and stored in a tightly stoppered bottle in the laboratory for approximately seventeen months.

ALTERNATED BETWEEN 0° C AND 5° C ROOMS
(LOT 2)

No. of Temperature Alternations	Per Cent of Seeds Germinating		
	Series A	Series B	Series C
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	5
5	8	15	20
6	72	76	28
7	57	88	33

The seeds (lots 1 and 3) which had been alternated between the other rooms failed to show a single germination. The data in the table, although not conclusive, indicates that the change of temperature is a very important factor influencing the germination of this species.

SULPHUR DIOXIDE AS A RIBICIDE

G. A. Root

Through the interest and cooperation of Mr. E. T. Hamlin, Agricultural Commissioner of Stanislaus County, a quantity of liquid sulphur dioxide was procured from the Ansul Chemical Company of Modesto, used to a large extent in the fumigation of dried fruit and to a less extent as a weed killer. The thought occurred to Mr. Hamlin that its use on Ribes would be worth trying.

He was able to procure for our use 7 cylinders of the chemical, each containing 8 pounds of the liquid under 80 to 100 pounds pressure which, when released, would be given off as a gas. Holes were made in the ground near the crown of a Ribes bush and a certain amount of gas injected. They varied in number and were made at different depths. The application of this chemical was made under the supervision of Mr. Quick. It is too early to say just what the result will be. Mr. Quick said that the bush began to show the effects of the gas before the desired amount was injected. In many cases this feature does not argur well for the ultimate death of the bush.

A WEE SMALL VOICE IN THE DARK

G. A. Root

Little has been said of ecology, the enigma of the blister rust program. Eradication and pine infection have thundered their volleys and "spirits" have been uncorked but ecology has remained silent. Perhaps it has been due to the negligence of the ecological workers in getting their message to ye editor. Be that as it may, this is a notification from yon sunny clime that Frank Patty and the writer are wrestling with the problem in California on the Stanislaus National Forest. Divested of the usual number of strong backs, the gentle art of carpentry and ditch digging incidental to the problem, has fallen upon the shoulders of these two.

Ribes seeds have germinated where it was thought impossible, and where most expected the mantle cover has remained a blank. But this has not dampened the ardor nor lessened the interest in this perplexing project. At the end of the season we hope to have something which may be of importance to the general program.

BLISTER RUSTERS FIGHT FIRE

So far this season 345 men of the Idaho Ribes eradication unit have been called to fight fire.

On July 10 the first call was made to suppress the Hemlock fire. Before it was under control the personnel of eleven camps were on the fire line. The first group to return to blister rust duty reported at camp July 20 and the balance at a later date. In all 250 men saw fire service ranging in time spent on the fire from one week to twelve days.

The fire on the Potlatch Timber Protective Association near Elk River called 95 of the Blister Rusters for two days before the blaze was controlled.

Reports reaching the Spokane Office indicate that all of the men gave a good account of themselves as fire fighters.

SANITATION OF NURSERIES

C. R. Stillinger

Mr. Johnson's article entitled "Why Not Re-eradicate Earlier" seems to be a very pertinent one with reference to nursery sanitation for white pine blister rust here in the West.

It has been apparent to all who know the control problem here in the West that it will be economically as well as physically impossible to completely eradicate the Ribes within the 1,500-ft. zone around our nurseries. It will probably be possible to find some Ribes each season the environs are inspected.

Under such circumstances the practical procedure for nursery sanitation would seem to be to eradicate around the nursery early in the

spring when the Ribes can be seen readily. This eradication should be done at least before there is any chance to form telia. In this way the pine in the nursery could be protected from infection for that season. If eradication is done later in the season, this will not give protection for that season and a year will be lost as far as the certification of the nursery is concerned. It appears that Johnson has suggested another practical idea for the sanitation of our pine-growing nurseries.

RADIO BROADCAST

G. A. Root

The last of a series of four talks on blister rust was broadcast from the N. B. C. studios over KGO in San Francisco on July 3. This was in keeping with the policy of the Department of Agriculture in having its various divisions use this agency for educational purposes.

COOPERATIVE BLISTER RUST CONTROL WORK IS INSPECTED

Dr. W. W. Stockberger, Director of Personnel and Business Administration for the Department of Agriculture; Elers Koch, Assistant Regional Forester, Region 1; Professor H. P. Barss, of the Botany Department Oregon State College; G. B. Posey of the Washington D.C. Division of Blister Rust Control; S. N. Wyckoff; J. M. Chambers of the Division of Personnel and Business Administration and C. C. Strong left Spokane July 21 on a three-day inspection tour of the Idaho operations.

The party visited the units operating near Headquarters, Pierce, Elk River and Clarkia. In addition the Long Meadow infection area was shown to the visitors.

TELIA FOUND AT NEWMAN LAKE

R. E. Myers

Telial horns were found on a heavily infected R. lacustre bush June 12. The horns were healthy and well developed but did not appear to be fully matured. Infection of R. lacustre is extremely heavy in the zone surrounding heavily infected pines producing abundant aecia.

AN APOLOGY

In last month's News Letter under the list of camp locations no mention was made of the Ribes eradication operations on Mt. Rainier National Park.

M. C. Riley is supervising a 20-man Ribes eradication unit. The work around Longmire was continued this year until July 14 when the eradication men moved to the Sunrise Park area on the north side of the mountain. Russell Dixon is camp boss.

NOTES

G. B. Posey of the Washington office arrived in Spokane from Washington, D. C. July 5 for an indefinite stay. He left July 8 with S. N. Wyckoff for a visit to the California operations returning to Spokane July 21. Mr. Wyckoff returned July 19.

* * *

J. L. Mielke and J. R. Hansbrough from the Division of Forest Pathology at Portland, Oregon left Spokane July 27 with E. L. Joy to inspect the newly found infection centers in the St. Joe National Forest.

* * *

H. M. Cowling and C. C. Strong left Spokane July 27 to secure pictures of conditions around the Savenac Nursery, Haugan, Montana, and around Honeysuckle Ranger Station on the Coeur d'Alene National Forest.

* * *

TRAVEL REGULATIONS

M. L. McWold

The Standardized Government Travel Regulations have been amended, effective July 1, 1931, and copies will be distributed as soon as received from Washington. One of the outstanding changes is the total allowance of $3.00 per week for laundry and cleaning and pressing of clothes, while in travel status, as compared with the former allowance of $1.40 per week for laundry and $1.25 for cleaning and pressing. This liberalized allowance applies only to such items incurred during travel status after June 30, 1931.

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August, 1931

W E S T E R N B L I S T E R R U S T

N E W S L E T T E R

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Confidential

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U. S. Department of Agriculture
Bureau of Plant Industry
Western Office, Division of Blister Rust Control
Spokane, Washington

RECONNAISSANCE ON THE KLAMATH NATIONAL FOREST, CALIFORNIA

T. H. Harris

In a recent issue of the "Siskiyou News" appeared the following brief item: "Blister Rust men are invading the last stronghold of the Indian, the cougar, and the mountain goat in California. Their search for sugar pine and the insidious fungus reported to be attacking it leads them into the wildernesses of the Klamath, Siskiyou, Salmon and Marble Mountains. Hope is earnestly entertained that the entire party will survive the hardships of the season. Before leaving Yreka a few weeks ago, each member made out a last will and testament, now on record at the office of the county recorder. Inquiries regarding the party should be directed to Sandy Bar Jim at Orleans, their official guide and interpreter."

To those not familiar with the Klamath region of northwestern California, this note is illuminating. For the information of interested relatives, word recently came out from Pigeon Roost that no fatalities have as yet occurred.

It is needless to emphasize further that the Klamath Forest is a very rough, mountainous region lying northwest of Mt. Shasta and separated from the coast of Del Norte County by a tongue of the Siskiyou Forest not over 20 miles wide, extending south from Oregon. The region is very interesting botanically, for here are localized species of trees and plants found nowhere else in the West. Douglas fir is the principal forest tree found everywhere. Except on favored slopes it is of medium size and contains a high percentage of rot. Sugar pine, yellow pine, and white fir (Abies concolor) follow next in abundance. Shasta fir (A. magnifica shastensis), some noble fir (A. nobilis), mountain hemlock (Tsuga mertensiana), white pine, and Jeffrey pine occupy the higher ridges and mountains. White pine here is a small tree rarely over 75 to 100 feet in height and one to two feet in diameter, and limby, being a true timber-line tree. The most interesting tree, and the one perhaps with the most restricted range, is the Brewer or weeping spruce (Picea breweriana) found at scattered stations on the high summits of the Siskiyou and Marbles at altitudes of 6,000 to 8,000 feet. Its chief characteristic is long pendulous streamers, branchlets hanging from the main branches giving the tree a decided weeping aspect. It is a beautiful and remarkable tree. It occurs in patches of one to several acres and individually here and there - extremely localized.

Knobcone pine (Pinus attenuata) seemingly has no altitudinal limits; it keeps company with the seaweeds of the beach and the white pines of the summit. It is a fire-type species, rarely attains a greater height than 40 feet (at least in this region) and a diameter of one foot. MacNab cypress (Cupressus macnabiana) is another peculiarly infrequent species found in the Siskiyous. Its thin trunk and branches and scanty grayish foliage melt into the background of the rocky slopes of its habitat. In the stream bottoms almost everywhere on the forest is Port Orford cedar; it sometimes occurs on most inhospitable sites. The golden-leaf chinquapin (Castanopsis chrysophylla) attains considerable size in the southwest corner

of the forest. One beautiful specimen 4 feet in diameter and 125 feet tall was found. Even redwood (Sequoia sempervirens) enters the forest from the west, and has as one of its associates sugar pine. The types of timber growth thus vary between wide extremes.

Sugar pine on the Klamath is obviously out of its optimum range. It forms from 2% to 10% of the stand almost everywhere, only occasionally rising to 15% and over to make a true sugar pine type. In the Bluff Creek drainage in the extreme southwestern corner of the forest is a stand of some 18 sections of pine. This lies within the fog belt, the trees having long streamers of Spanish moss on the branches, and the undergrowth of salal, rhododendron, huckleberry and tan bark oak being typical of the coast country. The pines are of medium height, and only fair in quality, and along the ridges of less than 4,000 feet elevation they have the appearance of timber-line trees. In the Sierra Nevada 4,000 feet is almost the lower limit of sugar pine growth, at least in its optimum range. A number of trees were found growing at an elevation of only 600 feet, scarcely 12 miles from the coast.

Sugar pine reproduction is almost everywhere good, especially on Bluff Creek. In some places it appears as though sugar pine is increasing itself in the stand.

Along the lower Klamath River a woodland type covers the south-facing river slopes. Tan bark oak (Lithocarpus densiflora), madrone (Arbutus menziesii), chinquapin, Oregon oak (Quercus garryana) and black oak (Q. kellogii) are the principal species.

Several shrubs are noteworthy. The Deer oak (Quercus sadleriana) is a shrub species with large chestnut-like leaves, under 10 feet in height, growing in dense thickets, and confined to this region. Rhododendron forms brush fields which in spring are masses of red blooms too beautiful to describe. There are species of huckleberry, salal, and shrub oaks innumerable, and even the prostrate juniper (Juniperus communis) grows on the western ridges, the plants looking like huge spiders.

The common Ribes species are Ribes cruentum (small, shiny leaves and spiny fruits), R. lobbii (similar to R. cruentum but with red, sticky, glandular fruits), and R. sanguineum, the red-flowering currant. These are found well distributed over the forest, along streams and elsewhere. In the southwestern corner of the forest (Bluff Creek) large quantities of thriving R. bracteosum occur. Rarer species of the high altitudes are R. binominatum, R. marshallii, and the less rare R. viscosissimum. Generally the Ribes are well scattered throughout the sugar pine type; some stands are almost Ribes free. If blister rust is to be controlled in this country, it will be a difficult problem. Numerous Ribes of many species, and scattered, marginal pine are the chief factors.

As section corners are unknown here, reconnaissance is somewhat more difficult than on the Sierran forests. It is necessary to run controls in

particularly difficult regions. No insurmountable obstacles have as yet been encountered, however.

The Klamath fauna is in keeping with the other characteristics of the forest. It is the wont of cougars to occasionally disturb the peace and quiet of the camp in the nocturnal hours. The first nightly visit so agitated one Idaho member of the party not yet accustomed to the kittenish ways of the California cats, that he set up a frightful outcry which unfortunately cut short the feline's visit. Now, however, it is no uncommon sight to see two or three panthers feeding contentedly at the garbage hole while dinner is being served.

CHEMICAL INVESTIGATIONS

G. R. Van Atta

The field program this year is being carried out in two principal locations. In California the area lying about Strawberry Lake and along the South Fork of the Stanislaus River in the Stanislaus National Forest is being utilized again. In the north a radical change of location has been made. The old experimental area along Renfrow Creek at Santa, Idaho has finally been depleted of suitable sites for further work. It seemed advisable at the start of the present season to search for a new location in those areas not likely to be disturbed by the rapidly growing eradication. When it is recalled that experiments frequently require several years for their completion, during which time the plants must remain on the plots, the reason for this decision is obvious.

A number of possible locations were scouted and one was finally selected as being the most suitable. The new area is in the Wenatchee National Forest in Washington and extends upward along the courses of Swauk and Iron Creeks from the junction of these two streams which is approximately two miles southwest from Blewett Pass in the Wenatchee Mountains. The area abounds in a number of species of Ribes, six of them including the four principal north Idaho varieties being immediately available in numbers, while three more species, among them R. bracteosum, can be reached with little trouble from the main location.

Some work having mainly to do with the completion of experiments started in previous years is being done at Clarkia, Idaho.

The new work being undertaken by this project during the current field season approaches the problem of eradication of Ribes with chemicals along two main lines of attack.

Preliminary work done in the field last summer, and laboratory work carried on during the winter months uncovered several new chemicals of high apparent toxicity to Ribes. Field application of these new chemicals constitutes one branch of the work.

Intimately connected with the first, but differing in principle, the second line of attack concerns itself with studies which are designed

to demonstrate conclusively the relative efficiency of a number of methods of application when used on various species of Ribes when judged from a purely technical viewpoint. Some of these studies are almost wholly physical in character, others are virtually laboratory physiological experiments carried out on field scale and under field conditions.

Particular interest attaches to the second division of the work, in which the somewhat novel principle of injection of toxic materials into the plant body is being contrasted with such treatments as soil drenches applied in several ways, ordinary aerial sprays and injections into the soil. Space does not permit an account of this work in any detail. While it is still far too early to predict what the final results from the diverse experiments will show, it is confidently expected that the present season's work will yield information of a very definite character concerning a number of puzzling and vexing aspects of the problem of chemical eradication.

STILL CREEK AREA - OREGON

Thos. B. Onstat

Here the work consists of reeradicating Ribes from stream types worked in 1928, 1929 and 1930 in addition to new territory where the streams and hillsides are both worked. To date, the reeradication has been receiving major attention.

Hundreds of bushes of R. lacustre are found having live stem growth normal to two and three-year-old plants, with very large roots which are many years older. In many instances these root systems are matted and interwoven into patches of two hundred square feet or more. To eradicate these, grub hoes must be employed, with the resultant hard and tedious labor.

R. bracteosum is prevalent in the varied concentrations along the streams. Former spraying has given a much lower kill in comparison to that achieved on R. petiolare in Idaho. So in addition to thoroughly spraying the leaf and stem structure of the R. bracteosum, the ground containing the roots is drenched as well. By this means it is hoped that a much cleaner kill will be resultant. The normal spray of 1.4 pounds Atlacide to 1 gallon of water is being used.

R. sanguineum, R. viscosissimum and R. triste are also found on the area but are of slight comparative importance.

EXPERIMENTS WITH SOUTHERN OREGON SPECIES OF RIBES

F. P. Sipe

In the fall of 1930 a Ribes garden was started at Rhododendron, Oregon near Mt. Hood. This region is rather badly infected with blister rust on the western white pine. The garden is made up of plants of southern Oregon species of Ribes. They were transplanted here with the

idea of getting data on their reaction to natural infection in a blister rust area.

The plants have become well established and show good growth this year. On July 24, 1931 the plot was visited by L. N. Goodding, and data taken on the infection, as shown below. Infected leaves were collected and saved as a permanent collection. The table below shows results.

Ribes Species	Plants Examined	Plants Infected	Data on Infected Plants			
			% Leaves Infected	% of Infected Leaves Covered With Blister Rust	% Infected Surface Bearing	
					Uredinia	Telia
R. klamathense (Klamath Lake)	12	2	25	8	90	10
R. klamathense (Prospect)	9	1	2	5	100	0
R. marshallii	36	3	25	15	40	60
R. nevadense	26	1	50	10	60	40
R. hallii	30	0	0	0	0	0
R. binominatum	30	Small infection early in season.				
R. sanguineum (native)	25	2	1	5	25	75
R. erythrocarpum	30	1	5	5	0	100
R. velutinum	31	1	5	30	100	0
R. cruentum	36	2	50	25	50	50

This experiment is of course too much in the beginning stage to be very significant. However, a brief glance over the foregoing table brings up some interesting points.

Two plantings of R. klamathense were secured, one from the shores of Klamath Lake, east of the Cascades, and the other from near Prospect, in the sugar pine region. These two forms have been suspected of being two different varieties. The Klamath Lake stock seems to have taken the rust much more readily than the Prospect stock, the latter having two bushes fairly well infected (25% of leaves). Both stocks bore a high per cent of uredinia and relatively few telia, at this date.

R. marshallii had three bushes rather well infected (25% of leaves), with 60% of the infected surface covered with telia. This species grows associated with sugar pine in the Siskiyou Mountains.

R. hallii, a species coming in heavily after burns in the higher altitudes of the sugar pine and western white pine regions of the southern Cascades, showed no infection. This species is closely related to R. viscosissimum.

R. erythrocarpum, the Crater Lake currant, is considered to be of particular importance at the Crater Lake National Park, because of its close associations with the susceptible Pinus albicaulis. Only one bush

was infected, and it very lightly. However, note that this infected surface consisted wholly of telia.

R. velutinum also had a light infection, but note that in this case there were no telia.

R. cruentum, a close relative of R. roezli, had good infection on two bushes, with a 50-50 proportion of uredinia and telia.

The Ribes garden is located within a few miles of rather generally infected white pines. The garden itself is compact, covering only a small area. It could be assumed that all bushes had about an equal chance for getting aeciospores. Experiments of this kind have certain advantages, as it has been recognized by workers that controlled greenhouse experiments often do not agree with observed reactions in nature.

After data have been taken on these bushes for a number of years, certain significant facts may appear. When this information is correlated with inoculation and plot experiments being carried on by various workers, and with the data being collected by field scouts, the whole will present evidence that should be fairly conclusive.

TAKING A WHIRL AT A GOOSEBERRY PIE

W. V. Benedict

If I had the task of removing Ribes from all the stream type within the Inland Empire white pine belt, and further, if I had already worked a nice healthy chunk of this area and reworked it, using the two accepted methods of hand pulling and spraying and then, upon inspecting it three years later noted countless numbers of seedlings invading the area--WHAT WOULD I DO?

First, I should make the decision as to just when these seedlings must come out, considering carefully the proximity of the rust and the rate of growth of the Ribes seedlings concerned. To aid in casting a judicious ballot I should request the ablest council from the damage to pine project and the ecology project.

Second, now that it is unanimously decided that these seedlings must come out and when they must come out, I should call in my lieutenants and instruct them to rework the areas the second time employing the most efficacious method extant. Upon the completion of this second reworking, the white pine would once again be protected, temporarily at least, and this brings up another point.

Third, in order to intelligently continue my eradication program I realize the urgent need of ecological information regarding the source of the seed responsible for these seedlings, how long I am to be confronted with seedlings appearing on worked areas and how rapidly these seedlings grow. Being a true, dyed-in-the-wool eradication man I straight way get impatient because of lack of basic information, and to mitigate my feelings, tear around and champ at the bit awhile, not neglecting to cuss occasionally. When I find that a third and a fourth reworking will be necessary before

hand pulling and spraying eradicative methods permanently break the Ribes flora in stream type I am not alarmed the next time I observe Ribes seedlings on a reworked area.

Lastly, after learning about Ribes from successive reeradications, I stretch out a long, emaciated, bony finger to Hiram and with the hope that springs eternal in the human breast, present my appreciation for permanent Ribes suppression through the medium of fire and grass.

RIBES ERADICATION IN CALIFORNIA

D. R. Miller

Ribes eradication in California for the summer of 1931 opened with two camps working on the Lassen National Forest. A fifteen-man camp started June 1 followed by a 20-man camp the 15th. Both camps are working on an area composed of about 20,000 acres of sugar pine timber lying on the northwest slopes of Deer Creek. In association with a high percentage of sugar pine occurs western yellow pine, Douglas fir, white fir, and incense cedar. As far as can be told at this time, no one timber type predominated in Ribes. On other areas on which experimental eradication has been done, sugar pine-fir type has always contained more Ribes than any other timber type. The five species of Ribes found, in the order of their abundance, are R. roezli, R. nevadense, R. inerme, R. viscosissimum and R. cereum.

There are few streams with running water on the area; and, in some cases, entire sections are void of stream type. This means that not only streams, but large draws are also absent. Such a condition makes it necessary for each man to carry his drinking water. Individual canteens and water bags are provided for this purpose.

The country is, as a general rule, rocky with many lava cliffs and granite outcroppings making the removal of bushes exceptionally difficult especially when a heavy growth of brush occupies the site. Each man is equipped with an eradication tool or "bat", as the crew men have dubbed it, made especially for digging Ribes in rocks but adaptable to any country. The head, weighing three and one-half pounds, has a narrow grub hoe blade on one side with a heavy pick on the other and is fitted with a standard size pick handle. This tool has proven effective even in R. inerme swamps where most of the bushes are hand pulled yet where portions of crowns or broken-off roots occurring under rocks and logs or in willow clumps, etc., can be readily removed.

The Ribes on this area are largely confined to the streams and draws, to certain brush patches, and to the rocky situations and cliffs leaving comparatively large portions of country interspersed which are sufficiently free from Ribes to enable them to be blocked out. The location and limits of these areas and the amount of live stem present are important. These are determined by augmenting the reconnaissance strips with four additional Ribes survey strips and then plotting the Ribes locations on a base map. This gives a sufficiently comprehensive picture of the amount and location of the Ribes on each section to permit the camp boss to work the area intelligently. After plotting the eight or nine strips per

section--a strip every ten chains--the Ribes free portions can be blocked out. However, before such areas are considered as completed, the camp boss extensively scouts them to see that no patches are missed. A few entire sections have been blocked out at a cost of from three to five cents per acre while the cost would have averaged approximately thirty cents per acre had a crew worked these sections searching for Ribes. It is thus important to keep crews out of Ribes free territory and, at the same time, to be certain that all country blocked out is free from Ribes. At least half of the area worked this season will fall in the Ribes-free class.

The California eradication project has worked toward a 50-ft. live stem limit in the past, but this season a definite limit of 50 feet of live stem was set as the dividing line between satisfactory and unsatisfactory work. The goal is not always reached the first time a crew covers an area; this is especially true in brush patches and stream type. Thus far the second working has brought the area within the 50-ft. limit. By having each crew rework all heavy Ribes patches before calling its block completed has proved effective in getting the block below the 50-ft. live stem limit.

Checkers take over the blocks after the crew foremen are satisfied that they are worked. Two per cent of all stream type and one per cent of timber type are systematically strip checked. All Ribes conditions are sampled, and each heavy patch is checked. If any individual patch checks more than 50 feet of live stem per acre, it is reworked even though the average for the block falls below. If the checkers find a number of bushes just off their check strip, yet in their estimation the live stem in that patch is sufficient to require additional crew attention, upon their recommendation, it is reworked. After each reworking, a new check is made.

A SUGGESTION FOR THE BIOLOGICAL CONTROL MAN

Frank A. Patty

During the last month several species of caterpillars have been observed working on Ribes leaves. In a few instances bushes have been completely defoliated and only pieces of the midrib are left on the bush. Usually before the caterpillars have had sufficient time to complete the job of destroying all the leaves on a bush, his or her task is interrupted by a large wasp. The latter insect stings the caterpillar to death, takes it to her nest and inserts her eggs in its body. The young wasps hatch out and find themselves surrounded with food necessary for the best development of a wasp. This may be considered as a bit of biological control exercised by Mother Nature to keep certain moths in check.

The State of California has elaborate insectaries for rearing beetles and other insects which destroy insects harmful to the farmer. Would it be too dangerous to propagate this little fellow who has as his principal diet leaves of R. roezli, R. cereum and R. nevadense? Perhaps the propagation of a leaf-eating insect would not help in the suppression of Ribes but possibly it is worth a trial. Page Mr. Goodding of Oregon!

PRIEST LAKE CREWS FIGHT FIRE

Both of Homer Hartman's camps of the Priest Lake eradication unit have had their share of fire fighting this season.

From July 27 to August 3 three crews were kept busy suppressing spot fires. On August 3 all of the men were called out to battle the Freeman Lake blaze and were kept on the line until August 8. Since that time no help from the blister rusters has been needed to subdue forest fires.

Reports to the office say that the boys are excellent fire fighters.

Two of W. G. Guernsey's camps were called out August 17 to battle a fire on Ladd's Creek below Big Island. Men from one camp and part of another were called to the Mason Meadows fire August 21.

MORE FIRE FIGHTING

H. E. Swanson

During the week of August 16 to August 25, fifteen Forest Service blister rust camps were called out to fight fire. On August 21, all of these fifteen camps, with a total of 300 men, were engaged in controlling the western and southern sectors of the French Creek fire on the Clearwater National Forest. With this fire under control Blister Rust employees were being released to return to their camps about August 26.

Some time was also lost from eradication work, by the camps on the Canyon and Oxford districts. However, there were no serious fires in that region. Incidentally this unit will be the only one to complete its area satisfactorily.

NOTES

G. B. Posey and C. C. Strong left August 26 on an inspection trip to the Priest Lake camps.

* * *

Miller Cowling left August 27 for the Clearwater country on a week's photographic trip.

* * *

J. M. Chambers and R. L. MacLeod left Spokane August 2 on a business visit to the Still Creek, Oregon and Mount Rainier eradication units. MacLeod returned to Spokane August 9 while Chambers and S. N. Wyckoff went to Daisy Lake, British Columbia, to inspect the blister rust infection area. J. L. Mielke and G. B. Posey joined the party at Revelstoke, B. C. where infection areas were examined. Mielke remained at Revelstoke, the other three returning to Spokane on August 13.

* * *

After spending a month working out of the Spokane Office, J. M. Chambers left August 21 for California where he will visit the blister rust control units. The Spokane personnel enjoyed the visit. Come again soon, Joe!

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Western Office, Division of Blister Rust Control
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TIMBER SURVEY AND FOREST TYPES OF MOUNT RAINIER NATIONAL PARK, WASHINGTON

W. F. Painter

Between July 6 and September 5 a timber survey of Mount Rainier National Park was made to ascertain the occurrence of western white pine (P. monticola), white bark pine (P. albicaulis) and Ribes so as to (1) permit the development of a general plan for blister rust control, (2) secure general information regarding cost of work, and (3) determine the presence of other centers of blister rust infection than those known in the Park.

As nearly as the topography would permit, the work was performed on a sectional basis. Due to the fact that a very small percentage of the area within the Park is surveyed, it was necessary to extend hypothetical section lines from areas surveyed so as to have a definite basis for the work. In sections having western white pine and white bark pine or containing one species separately, which was quite often the case, four strips were run in a cardinal direction at right angles to the drainage at ten chain intervals. One-tenth acre plots were taken on these strips every ten chains. As previously mentioned, the topography necessitated some deviation from the system outlined because it was not always possible to cross the deep canyons or scale the steep slopes. A total of 85,000 acres was covered. Approximately 8,700 acres of this total was white pine and white bark pine type.

Forest conditions in Mount Rainier National Park present many interesting features, due to the variations in elevation and rugged topography of the country. The area is volcanic in origin with deep narrow canyons cut by glacial action and numerous park-like areas or upland meadows. In the 324 square miles, which is the approximate area of the park, one is able to observe so far as plant life is concerned, conditions comparable to what a person might observe if a trip were taken from Seattle to the North Pole.

Four distinct life zones are represented within the area, viz., the Transition, Canadian, Hudsonian and Arctic zones.

In the Transition Zone which consists of the lowland type quite characteristic of the Pacific Coast region, the chief tree species are Douglas fir, western hemlock, western red cedar and western white pine. Underbrush is usually quite heavy and a profusion of herbaceous plants usually occurs. Pure stands of western white pine are rare, but occasionally occur, especially following burns. It is usually found in association with the other species indigenous to the zone. The Transition Zone has its upper limits around 3,000 feet elevation.

Due to the fact that the Canadian Zone possesses so many of the characteristic trees of the Transition Zone it is rather difficult to determine just where the Transition Zone ends and the Canadian Zone begins. Perhaps it might be wise to say: "There isn't any beginning, hence there can't be any ending". However, I will consider anything from 3,000 to 4,500 feet as the Canadian Zone. In this zone the general character of the forest is intermediate between the lowland type, or Transition Zone

and the sub-alpine type of the higher elevations. The forest in this zone is continuous for the most part and fairly dense except in exposed situations and on wind-swept ridges. The prevailing tree species are western white pine, (P. monticola), lovely fir, (Abies amabalis) and noble fir (Abies nobilis). It is not uncommon to find all the species occurring in the lowland type at the lower limits of this zone and sub-alpine species occurring at the upper limits. Brush conditions are similar to those of the lowland type but the herbaceous plants are not so profuse.

From 4,500 to 6,500 feet one finds conditions characteristic of the sub-alpine type as it is generally known, or the Hudsonian Zone. Numerous of the park-like areas common to Mount Rainier National Park are found in this zone. White bark pine (Pinus albicaulis) has its optimum range within this zone. The forests are quite broken by the grassy mountain meadows or parks, rocky slopes and barren summits. The chief species indigenous to the Hudsonian Zone are white bark pine (P. albicaulis), alpine fir (Abies lasiocarpa), mountain hemlock (Tsuga mertensiana), and trailing juniper (Juniperus communis). The forest floor is virtually devoid of brush and heather constitutes the chief forest floor covering. In the summer many varieties of flowers common to the higher elevations are found within the park-like areas. At the lower levels of this zone trees attain a height from 50 to 60 feet but diminish in height as elevation increases. For the most part the trees are dwarfed due to short growing season, excessive cold winters and the constant winds. The trunks are usually bent and twisted by the strong winds and the heavy winter snows.

It is not uncommon to find clustered clumps of alpine fir and mountain hemlock at the upper limits of this zone completely prostrate due to the extreme conditions under which the trees grow. Occasionally one may see a tree 10 to 12 inches in diameter with a height of only 5 to 8 feet within these clumps, but these occasional specimens are usually so distorted one could hardly consider them as trees.

From 6,500 to 14,408, or the top of Mount Rainier, one finds conditions characteristic of the Arctic Zone. The area is practically devoid of plant life except for occasional prostrate clumps of trees and heather. The area is practically a barren waste consisting of rocky slopes, snow fields and glaciers. Glaciers constitute about 90 per cent of the area above 8,000 feet. Conditions are not conducive to plant growth, due to almost constant freezing temperatures and the exceedingly heavy snowfall in winter. In this discussion of life zones I have confined myself to Mount Rainier National Park alone. Conditions would perhaps vary in other localities as latitude is as important a factor as elevation.

Western white pine is found practically in every locality within the Park in the lowland type. White bark pine is found on the north and northeast sides, with the best stands occurring in Huckleberry, Sunrise, Bear, Burnt and White River Parks. An excellent stand was found on Crystal Mountain along the north boundary of the Park, while a fair stand was also found contiguous to Typsoo Lake in the northeast section.

CALIFORNIA RECONNAISSANCE IN COOPERATION WITH THE FOREST SERVICE

T. H. Harris

For a number of years the California Forest Experiment Station has been engaged in preparing a cover type map of the forested regions of California. In past years the Station has been loaned the reconnaissance data which this Division has collected on several forests from which some helpful information has been gleaned. It did seem, however, that with a few changes in or additions to the methods of our reconnaissance, much more relevant material could be gathered for the Station without jeopardizing our own aims or the cost of the work.

As the result of several interviews with A. E. Weislander handling the making of the map, it was agreed in May that the old system of timber typing (adopted from the Forest Service of Region 5 in 1926) in use until that time by reconnaissance parties be discarded in favor of the system used by the Station in the preparation of the cover type map. The old system, while it possibly sufficed for blister rust purposes, was admittedly inaccurate in depicting the true character of the timber types. This is more especially true of the northern Sierra Nevada and the mountains in the northwestern part of the state.

The new system contains three classifications: 1, Treeless Land; 2, Woodland Types; and 3, Timbered Areas. The timber types (of 3) are named as nearly as possible from the species of trees composing the type in question, the symbol of each species which composes at least 20% of the stand appearing in the type name. Thus Ydr designates a stand of yellow pine, Douglas fir and red fir in which each of these species is present to the extent of at least 20%. A direct gain in accuracy was in this manner afforded to our records, and a considerable saving in time and money effected to the Forest Experiment Station since areas covered by our reconnaissance did not need to be remapped.

To make the reconnaissance data more readily available to the Forest Service without the necessity of shipping field records back and forth, special topographic maps were prepared in the field showing the types as they were daily obtained. These maps were enlargements of U. S. G. S. quadrangles mounted on linen and were furnished by the Station. They were a material help to the reconnaissance party in the degree of topographic detail they showed, and the transfer of types to them served as a check upon the work of the men. At the close of the season they were turned over to the Experiment Station at Berkeley.

RE-ERADICATION ON MOUNT RAINIER

M. C. Riley

Conscientious readers of the News Letter may recall reading about Narada Falls, our "pet" area on Mount Rainier National Park, where there were so many bushes pulled and so little chance to hang them that it was

necessary to build a rack in which to put the bushes in order to keep them off the ground.

In the 1930 work there were removed 637 R. lacustre, 3,275 R. bracteosum and 110 R. acerifolium from 1.3 acres or 490 R. lacustre, 2,517 R. bracteosum and 85 R. acerifolium per acre. This work required 14.3 man days actual pulling time.

Exactly one year later this same area was reworked in 1.5 man days with the following results: There were 396 R. bracteosum seedlings and 6 R. lacustre seedlings removed per acre, 108 R. bracteosum and 8 R. lacustre sprouts, and 8 R. bracteosum and 1 R. lacustre of missed bushes. This gives a total feet of live stem per acre of 136 R. bracteosum and 16 R. lacustre. No extra time was spent in searching for seedlings but those pulled were in spots where they constituted the only ground cover present and were easily seen.

These latter figures do not represent all of the live stem left on the area after the first working because there are still Ribes there and probably will be for some time to come, but it is safe to say that there is less than 50 feet of live stem per acre left on the area. No especial credit is being taken for the results obtained because the original stand was almost solid Ribes and there was less chance of missing them than there would be where the Ribes were more scattered.

Checking of areas worked in 1930 showed one area where even better results were obtained, thanks to an "act of God". This area extends from the mouth of Van Trump Creek to the point where the road crosses, and consisted of about ten acres of stream type. Late in November a cloudburst occurred at the head of Van Trump Creek and as a result of the excessive amount of water carried down the narrow stream, all mineral soil, brush, etc., along the stream bottom was washed away and nothing remains except boulders. Incidentally, the mouth of the stream is now nearly a quarter of a mile farther up the Nisqually River. Careful examination along each bank of the creek failed to reveal a single Ribes in the entire distance where the washing occurred and, judged by comparable areas in the vicinity, there will not be any Ribes there for several years.

OPERATION OF GOVERNMENT TRUCKS EXPENSIVE

Cost of operating Government owned trucks on blister rust control work for the calendar year 1930 varied from 4.69 cents per mile to 14.3 cents per mile, according to figures given out by R. L. MacLeod.

The figures given out by MacLeod include the actual operations costs plus depreciation. For cars purchased in 1930 depreciation was figured on a basis of 20,000 miles.

A Chevrolet 1/2-ton #10 recorded the lowest cost of operation. This car was used on the damage to pine project and approximately one-half of its

mileage was recorded on good roads. The highest cost was turned in by the G.M.C. 1-ton, 14.3 cents per mile, but this figure includes the salary of the truck driver. Of the twelve trucks operated by the office in 1930, seven 1/2-ton or pickup trucks, both Fords and Chevrolets, operated at an average cost of 4.997 cents per mile, four 1-1/2-ton trucks, two Chevrolet and two Fords operated at an average cost of 3.79 cents per mile. The complete tabulation follows:

COST OF OPERATING GOVERNMENT OWNED TRUCKS - 1930

B. R. C. No.	Truck	Model	Where Operated	Total Mileage	Miles Per Gal.	Operating Cost Per Mile (Cents)	Depreciation (Cents)	Ave. Cost Per Mile (Cents)	Remarks
1	GMC 1-ton	T20 1927	North Ida.	39,724	10.6	10.5	3.8	14.3	Operating cost includes pay of operator.
6	Ford pick-up	A 1928	"	30,610	16.9	3.21	2.0	5.21	Used mostly over poor or unimproved roads.
2	Chev. 1½ T.	1930	"	6,289	10.6	3.14	3.0	6.14	
3	"	"	"	8,565	12.2	3.07	3.0	6.07	Used infrequently on good roads.
9	Chev. ½ T.	"	"	5,125	15.1	2.51	2.5	5.01	¾ of mileage over poor roads.
10	"	"	"	6,798	15.1	2.19	2.5	4.69	¼ of mileage over good roads.
11	"	"	"	9,832	15.4	2.51	2.5	5.01	Used infrequently on good roads.
12	"	"	"	9,087	15.4	2.86	2.5	5.36	Mostly over poor roads.
5	Ford pick-up	A 1930	Calif.	8,046	15.0	2.21	2.5	4.71	
7	Ford 1½ T.	AA 1928	"	12,701	11.5	3.99	3.0	6.99	Almost all mileage over rough mountain -ous roads.
8	"	"	"	10,236	10.8	4.96	3.0	7.96	
4	Chev. ½ T.	"	Ore.	12,636	17.2	2.5	2.5	5.00	1/4 of mileage over poor roads.

WHAT PLACE HAS FIRE IN A BLISTER RUST PROGRAM FOR CALIFORNIA?

W. V. Benedict

The employment of controlled fire as an instrument in securing the permanent suppression of Ribes in stream type is receiving more and more attention in the Inland Empire. Its use is especially applicable to Ribes

inerme areas because such areas have as yet not responded too well to either of the orthodox methods of hand pulling or spraying.

In the northern part of the commercial sugar pine range in California, more particularly on portions of the Eldorado, Tahoe and Lassen National Forests, R. inerme occurs under much the same conditions as prevail in R. inerme types of the Inland Empire. The California eradication forces are thus faced with the same "inerme" problems that present rather serious obstacles to the Idaho eradicators. Spraying with present prescribed chemical and hand pulling methods are not producing the desired results in R. inerme sites. These methods are expensive and none too efficient. Although they will serve, with more or less continued attention on the part of the eradicators, a less expensive and more permanent method is earnestly sought. Diesel oil failed to produce the hoped-for results on R. inerme and with no additional enlightenment in the chemical world at present, we turn toward fire.

Let us analyze the possibilities of employing fire in the California R. inerme types: As a general rule R. inerme does not present a serious problem outside the environs of the meadow and sluggish stream types. It does occur along the streams of the upland type but being a bit out of its element in such places it can readily be eradicated by ordinary hand pulling methods. Along the sluggish streams in and near meadows R. inerme occurs in heavy concentrations intergrown with willow, alder, wild rose and other stream type vegetation. The only coniferous growth in the meadows, if any be present at all, is scattered lodgepole pine which could be readily felled along with the deciduous plants in preparing the area for burning. In contrast to Idaho conditions where heavy stands of pine grow to the very edge of the streams, the usual condition in California is a somewhat open stand of white fir and lodgepole pine along the edges of meadows, the sugar pine and yellow pine occurring farther up the slopes. Firing such areas during the rainy season should be relatively safe.

The meadows in the California forests are all heavily grazed. Additional forage would be a welcome asset to the forest. Burning the Ribes and intermixed plant growth along streams would permit the establishment, with a little assistance from planted grass seed, of additional forage area. This procedure would not be robbing the forest of timber producing sites for coniferous growth is exceedingly difficult to attain in meadow type.

Hiram, we want you, with your background of stream type burning experience, to pay us a visit and look over some of our R. inerme country with the idea of starting a few fires in California.

SYMOPSES OF RECENT DECISIONS BY THE COMPTROLLER GENERAL - GENERAL ACCOUNTING OFFICE

A-38695, Saturday half holidays - Leave of absence without pay.

Time on Saturday in excess of four hours has a holiday status and should be excluded from annual leave with pay and included in sick leave and leave

without pay. 10 Comp. Gen. 400; Ops. Atty Gen. Dated March 17, 1931, and June 25, 1931.

If a per diem or per annum employee is properly entitled to the Saturday part holiday with pay, active duty pay for part of the Saturday should be computed on the basis of a four-hour day, each hour's work being computed as one-quarter of a day's pay, whether the regular number of hours' work on other days be seven or eight.

An employee in a pay status part of a Saturday but in a non-pay status at the close of business on such day, generally should be given no benefit of the shorter day, pay for the portion of the day worked to be computed on the basis of a regular working day. September 29, 1931.

Saturday half holiday--part time and intermittent employees (A-36473).

Employees for whom no regular hours of work are fixed, whose employment is part time or intermittent, and who are paid by the hour for the time actually worked, are not entitled to the benefits of the act of March 3, 1931, 46 Stat. 1482, granting Saturday half holidays to certain Government employees May 9, 1931.

A-38575. Traveling and subsistence expenses--annual leave.

Duty voluntarily performed by an employee while in an authorized leave status at his home does not operate to change his status from that of on leave and he may not be reimbursed for expenses so incurred nor paid per diem in lieu of subsistence for such days. September 24, 1931.

A-38655. Traveling expenses--mileage for use of privately owned automobile.

The act of February 14, 1931, 46 Stat. 1103, authorizing the payment for the use of a privately owned automobile on official travel on a mileage basis, limits such payment to the employee's "own automobile" and payment on a mileage basis may not, therefore, be made to a civilian employee for the use of a borrowed automobile. September 29, 1931. (See paragraph 11 and 105 (e) of Standardized Travel Regulations)

Traveling expenses--first duty station (A-37507) (S).

The fact that a newly appointed employee is required to report at the official headquarters of the district to which he is assigned before proceeding to his designated official station from which he is to operate, does not excuse him from the general requirement that newly appointed employees must bear the expense of placing themselves at their first post of duty. 5 Comp. Gen. 804, distinguished, 539, August 7, 1931.

A-38077. Traveling expenses--personal.

An employee absent from headquarters on official business who interrupts his travel status to proceed to another point due to the death of a relative and who is recalled to headquarters from that point, is entitled to reimbursement of so much of his actual expenses, including per diems,

as would have been necessary had he returned to headquarters from his place of temporary duty. Sept. 16, 1931.

A-38284. Traveling expenses--airplanes--emergencies.

The use by an employee traveling upon official business of airplane transportation at a cost exceeding that by railroad is not authorized except in case of an emergency, such as an occurrence which could not have been anticipated and could not have been postponed and which required the immediate presence of the employee for the purpose of saving life or averting disaster, or, in exceptional cases, to keep an appointment necessarily made on short notice and the failure or postponement of which would seriously disrupt important Government business. The mere expediting of Government business does not constitute anemergency authorizing the use of airplane transportation at a cost in excess of that by railroad. 9 Comp. Gen. 354, amplified. October 1, 1931.

A-37388. Traveling expenses--false statements.

Where an employee makes false statements or submits fraudulent receipts as to certain items in his claim for reimbursement of expenses incurred, leaving doubt as to just what expenses were actually incurred, the entire claim will be disallowed. 10 Comp. Gen. 138, July 28, 1931.

A-36301. Disbursing officers--correctness of payments--responsibility.

The responsibility of disbursing officers is a personal, bonded one that public moneys be not paid except in discharge of legal obligations of the United States and the burden of establishing such fact is on the disbursing officers***.

Armory drill and administrative function pay - National Guard--31st day of month. (A-36325).

An officer of the National Guard entitled to armory drill or administrative function pay on a monthly or annual basis who attends an encampment beginning on the 31st day of a month and thereby becomes entitled to and is paid Federal pay for the 31st day of the month pursuant to section 3 of the act of September 14, 1922, 42 Stat. 841, is not in armory drill pay status on such 31st day of the month, and accordingly in computing such armory drill or administrative function pay to which entitled for the month, one-thirtieth of the monthly rate should be deducted as required by the last sentence of section 6 of the act of June 30, 1906, 34 Stat. 763, June 4, 1931. Note: This is another application of paragraphs 20 and 21 of the Fiscal Regulations of the Department of Agriculture, regarding salary for the 31st day of the month.....M. L. McWold.

EXHIBITS PUT ON AT THREE FAIRS

White pine blister rust demonstrations were given at three fairs this fall, the Western Idaho State Fair at Boise, Idaho; the Clearwater County Fair at Orofino, Idaho; and the Bonner County Fair at Sandpoint, Idaho. Plans had been made to include the Western Montana State Fair at

Missoula, Montana but at the last moment that fair was cancelled.

The Western Idaho State Fair opened September 2 and closed Sept. 5. Three large cases showing all phases of the blister rust program were used, together with the automatic slide projector. A series of 68 colored slides was used. A large crowd turned out each day and many of the people showed interest in blister rust. While the demonstration was given far from the white pine belt the yearning for information was quite marked.

The Clearwater County Fair was much larger this year than formerly and many people examined the material and watched the slide series. Blister rust is fairly well understood in the Clearwater region and most everyone knows something about it. That fair opened September 17 and closed September 19.

By far the most enthusiasm for learning about blister rust was shown at the Bonner County Fair at Sandpoint. A crowd was packed around the exhibit there from the time the fair opened at 10 a.m. September 24 until it closed at 9 p.m. September 26. The same exhibit material was used at Sandpoint as was used at Orofino and Boise. In addition, the booth was plentifully decorated with white pines. One kindly gentleman, who was clearing 30 acres of land for agricultural purposes, generously offered "as many white pines as you need for decorative purposes." Three truck loads of small trees were used and the result was conceded to be the best looking exhibit at the show.

No record was kept as to the total attendance at the three fairs.

BLISTER RUST AT A LOGGING CONGRESS

A small western white pine tree infected with blister rust was the headline attraction in a blister rust control demonstration put on by Lee White at the Logging Congress, sponsored by the Potlatch Forests, Incorporated, at Headquarters, Idaho October 22. About 200 lumbermen from all over the Pacific Northwest attended the congress.

The blister rust display consisted of the infected tree, a Ribes petiolare bush, eradication equipment set up ready for use, a repair kit and chemicals used in chemical eradication of Ribes. The entire display received much attention but the infected white pine was most closely scrutinized.

The party landed at Headquarters on a special train of eight pullmans early in the morning of October 22 and were taken by train to camp No. 10 of the Clearwater Timber Company where selective cutting methods were studied. The party also had an opportunity to view a large tract of white pine land en route to the camp.

A meeting was held early in the afternoon after which the delegates viewed the exhibits prepared by various commercial organizations.

A fire fighting demonstration by the Forest Service and a fire detection demonstration by the Clearwater Timber Protective Association were of special interest. Logging machinery and equipment were also demonstrated.

The congress was run right on schedule, despite the heavy rain which fell most of the time.

CALIFORNIA APPARENTLY FREE OF RUST FOR ANOTHER YEAR

G. A. Root

In spite of the fact that blister rust was found this year at Brush Creek in Curry County, Oregon, intensive scouting along the northern border of California failed to reveal any signs of the disease in this state. The discovery of the rust even at only one of the two locations of 1929 led to the fear that it might be found this side of the line.

It must be conceded that 1931 was a poor year for the spread of the rust. Its presence only at Brush Creek in that southwest corner is another one of many perplexities which face the blister rust squad.

RIBES SEEDS AND BIRDS

F. A. Patty

For the past two seasons small pellets composed chiefly of Ribes nevadense seed have been found three miles from Strawberry on the South Fork of the Stanislaus River. The pellets measure from one-half to one and a quarter inches in length and are conical in shape. In some instances small pieces of skin of R. nevadense fruits and other seeds are found. In early August these pellets were found in a fresh condition, in fact they had been deposited on rocks, stumps, upturns, logs, etc., only a few hours before they were collected. The conical masses of seeds were still quite moist and were held together by a saliva-like substance. The sun dries the seeds out but they retain the form in which they were deposited until the fall rains begin.

The pellets are probably deposited by birds which gorge themselves with the berries, digest the pulp and most of the skin and then disgorge the seeds. Robins, quail, sparrows and other birds were found feeding on the R. nevadense fruits. It is fairly evident that the seeds have not passed through the digestive tracts of the birds.

The peculiar thing about these pellets is that they have been found only in the one location. However, they probably could be found in other localities where currants grow.

This article was written for the purpose of finding out whether or not any members of the office have made similar observations.

PUBLIC SERVICE PATENT GRANTED OFFORD AND MIROV

Messrs. H. R. Offord and Nicholas T. Mirov of the Berkeley Office, were granted a patent covering a process for fireproofing and waterproofing textiles on September 1, 1931. The patent number is 1821317. The process for fireproofing and waterproofing textiles was developed to protect the men engaged in spraying sodium chlorate and similar combustible spray materials. Messrs. Offord and Mirov are to be congratulated on securing this patent.

R. G. P.
Eastern News Letter, Sept., 1931.

TRANSFER TO PLANT QUARANTINE

C. M. Chapman and George Whiting were transferred from the Division of Blister Rust Control to the Plant Quarantine and Control Administration September 21. Chapman is on inspection duty at Ogden, Utah while Whiting is at Spokane.

C. O. Peterson was transferred September 16 and is now on inspection duty at Portland, Oregon.

NOTES

G. B. Posey left for Washington, D. C. October 23 after spending the field season becoming acquainted with all phases of the western work.

* * *

S. N. Wyckoff returned October 7 from a business trip to California.

* * *

R. L. MacLeod returned to the office October 26 after spending a week's vacation at Penticton, B. C.

* * *

The California contingent is once more toiling in the Spokane office, having forsaken the land of sunshine for the winter. Roy Blomstrom arrived October 2, W. V. Benedict October 6, Frank Patty October 10 and Tom Harris October 11.

* * *

We hereby extend our heartiest congratulations to Mr. and Mrs. J. F. Breakey on the arrival of a husky nine-pound daughter, Leona Jane, at the Deaconess Hospital October 22.

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ARE BLISTER RUST CONTROL PLANS AND RIBES ERADICATION METHODS ADEQUATE TO MEET THE BLISTER RUST SITUATION IN THE WEST?

W. G. Guernsey

It is generally considered a form of gambling for people to formulate ideas too hastily on important problems. For this reason, if no other, I attempted to look things over and to weigh carefully important statements made by companions on my recent trip through the white pine areas of the eastern United States. The control of blister rust in order to secure white pine protection through its life in the timber stand is indeed a very weighty problem to solve.

In passing from point to point on a trip through New England, one's ideas gradually change. At first (that is to the western view) the apparent lack of merchantable white pine is very noticeable. Then as one proceeds along the route one realizes the value of fast growing young white pine and its value to box, wood-working and barrel manufactures in the community. A large portion of these areas have white pine regrowth that approaches as near one hundred per cent regeneration as any tree species can. Along with this realization of white pine importance is the fact of its being heavily infected by blister rust.

Flags caused by killing blister rust cankers on twigs and branches of white pine can be easily seen while passing. This condition prevailed through practically all the white pine areas visited. The presence of the rust is so impressed on one's mind from continual inspection of infected trees that it is rather hard to keep from having a pessimistic viewpoint.

The itinerary of our trip began at Boston, Massachusetts and proceeded north through York County, Maine. From Bethel, Maine we wound on up through a pass in the White Mountains to Littleton, N. H., traveling on an excellent three-way cement road. The ease of transporting logs from the wooded areas to the numerous small mills was very apparent. Upon reaching Littleton, N. H., we decided to visit the Waterford area.

The Waterford infection area is located on the Lee farm just east of St. Johnsbury, Vermont. It seems that white pine was first infected by spores of Cronartium ribicola from Ribes nigrum grown near an old barn some two thousand feet from the pine grove. The pine is of all ages and diameter classes with the larger trees on a rise of ground east of the younger age classes. A striking point about this infection is that white pine of larger diameter classes are heavily infected. Many trees are dead and some have fallen. The wild Ribes averaging about ten or fifteen per acre had been pulled in and around the grove and very few could be found upon careful inspection.

The other plots visited in that general region bore out the fact that all pine age classes are heavily infected. The Ribes were few and I was

told the wild Ribes would probably average about fifteen per acre in that general region. This lack of wild Ribes with heavy infection present was a source for considerable thought because, as we know here in the West, we have far greater concentrations of Ribes.

The itinerary called for us to continue our travel down through Franconia Notch to Concord, the state capitol, and so on to Exeter, New Hampshire, for a stop-over with agent Swayne.

From Exeter numerous short trips were made to inspect areas on which wild Ribes had been pulled in the early stages of rust control. Inspection revealed that there was practically no blister rust where Ribes had been pulled and the areas reworked at a five or six-year interval. That is, the young pines of eight and ten years of age had come in and were generally free of rust. However, other plots on areas visited, to which no protection was given, showed that at least sixty or seventy per cent of the trees were infected, with no hope of recovery. The rust seemed to attack the dominate and co-dominate trees in the stand, leaving the suppressed trees to take their place. A certain percentage of rust was also present on areas of young pine on which no re-eradication had been carried on.

It was in this same general region that an interesting fact was noted. The white pines located near heavy concentrations of wild Ribes were not infected to any greater extent than the areas of pine with few Ribes interspersed in the stand. This proved to be the case in practically all the areas visited in that region. The explanation seemed to be that a few scattered full-grown Ribes whose heads are above the lower vegetative screen in the stand will pass infection along to white pine in a very short time. In other words, the infection will cover the pine on a large area with the assistance of these scattered Ribes.

I continued my travels from Exeter, New Hampshire through southern New Hampshire to Boston, Massachusetts, then to Worcester, Massachusetts. There I was joined by Mr. K. Stimson of the Boston office and we proceeded to Keene, New Hampshire. The Yale school forest is situated near Keene. White pine of all age classes predominates on the forest. These pine areas have been protected by pulling the Ribes and practically no rust is visible in the stand. This area gave me a better feeling as the picture to date on the trip had been somewhat gloomy.

We continued on up through Vermont and over to Warrensburg, New York. Throughout all these regions one is forcibly reminded of the havoc caused by blister rust.

My opinion was in no way changed by examining the many plots in the Warrensburg territory. The Ribes are more plentiful in this region. Here the Ribes situation approaches the conditions found in the West.

It is quite evident that the white pine rotation has been set back many years in the East by the action of pine killing blister rust. Blister

rust has been very deadly in its progress of killing white pine. The eradication of Ribes has prevented this progress on the younger pines that have sprung up after the first control measures were taken. As our white pine here in the West is even more susceptible than eastern pine (about seventeen times as much) with the rust present on large areas we can expect to have our pine rotation set back at least thirty or forty years.

After this rather rapid, tho intensely interesting eastern trip, the repetition of conditions led me to form several objectives.

The first is that we here in the West must change our manner of attack if blister rust is to be prevented from killing our young white pine. Whereas, we have been carrying on stream type eradication it is necessary to change from this system to complete eradication of all Ribes in white pine areas. It will also be necessary to eradicate the Ribes from large blocks of white pine and insure protection by eradicating the Ribes from protection strips around the pine areas. As the western pines and Ribes are more susceptible to blister rust, the protection strip should be about one-quarter mile in width. The exact width of this protection strip is rather hard to judge with no exact information at hand.

The following up of this eradication by re-eradication is just as necessary for pine protection as the first work. To insure this second protection phase, it will be necessary to plan the progress of the work to be in keeping with available finances. If we should suffer a great loss of white pine in our next rotation after spending large sums of money for protection, it will be a black mark against our methods and policy.

I should judge also that it would be most feasible to have our cooperators educated somewhat on the idea that we will lose some of our pine in the next rotation as the rust is already here, but continue the educating process that protection to white pines by eradicating the Ribes will insure pine protection. It is just a thought that some of our new cooperators have the idea that one eradication of Ribes is sufficient to insure protection.

Another rather practical objective to insure more progressive control measures would be the permanent assignment of personnel to respective areas, or jobs. In this way these men would handle all the details pertaining to the assignment. They would then have a first-hand knowledge of dealing with the respective cooperators and be in close touch with the situation. This would be of vital assistance in dealing with the local cooperators in the field. This plan would also be of assistance to the men in making control plans and carrying out the protection measures necessary.

My ideas of the blister rust situation are probably still very hazy but I am sure of one thing. That is when blister rust concentrates

on white pine here in the West it is going to be a terrible blow to pine owners. One can hardly ride day after day through the white pine forests of the northeastern states and not forsee such a result in the West.

The actual importance of white pine to the Inland Empire is impossible to determine. White pine is our basic tree, on which commercial enterprises hinge. The blister rust is here to stay and kill this important tree species. It is a problem that must have a well organized campaign to stop and that is our job.

PROGRESS OF RIBES ERADICATION IN THE INLAND EMPIRE, SEASON 1931

C. C. Strong

The campaign during the fall and winter of 1930-31 for securing funds for Ribes eradication in the Inland Empire is now a matter of history. In light of the widespread devastation now under way throughout the adjoining white pine stands of the interior of British Columbia, especially as revealed by surveys and examinations made in the last three months, this campaign was a most timely one. It is a most regrettable fact, however, that if this campaign could have been made with equal effect five years ago (with adequate increases annually to now,) there would be at present a good possibility of heading off much of the destruction from blister rust which is inevitable in the Inland Empire. Let this be a warning to California.

As a result of the effort to secure blister rust control funds, there was available for expenditure on Ribes eradication during the season of 1931 and the starting of the work in the spring of 1932, the following amounts:

1. Clearwater National Forest	$215,700.00
2. Clearwater Timber Protective Association	61,100.00
3. Potlatch Timber Protective Association	30,750.00
4. Upper St. Maries Drainage	18,000.00
5. Priest Lake Timber Protective Association	15,000.00
Total	$340,550.00

The above figures include funds appropriated to the Division of Blister Rust Control to meet the cooperation of owners involved. In addition to this, about $8,000.00 was available for Ribes eradication in the Mount Rainier National Park.

In the case of the National Forest operation $195,000.00 of the sum listed was appropriated directly to and expended by the United States

Forest Service. The technical supervision and direction of the field work was done by personnel of the Division of Blister Rust Control. Likewise the appropriations for blister rust control on Mount Rainier National Park were made directly to the Department of the Interior. The technical supervision of this work, however, fell to the Division of Blister Rust Control. On all the other projects listed the Division of Blister Rust Control assumed entire direction of the work and expended the funds.

Such a large and sudden increase in the Ribes eradication project added a tremendous responsibility to the Division of Blister Rust Control. Not only did it necessitate the gathering together of experienced camp bosses and crew foremen to man thirty-seven field units averaging about 20 men each but the load on the fiscal and administrative departments was increased proportionately. While those who were entrusted with the field supervision of this work had no fear of their ability to meet the added responsibility, they were fully cognizant of the probable apprehension in the minds of others that such a sudden increase might result in a general decrease in efficiency and relatively higher costs per acre. Hence, it is especially gratifying to report that efficiency did not suffer and that relative costs did not increase. In fact, it is generally felt by those who were able to observe the work closely that better work was done this season than ever before and that the average volume of work per man increased to a noticeable degree.

Work on the Clearwater National Forest consisted of both upland and stream type Ribes eradication. It centered largely on the northern section of the Musselshell ranger district, the Orogrande, French Creek and lower Weitas Creek drainages and the area lying north of Elk Mountain between the North Fork of the Clearwater River and the Clearwater Timber Protective Association boundary. Twenty units were employed on the forest.

On the Clearwater Timber Protective Association only stream type Ribes were treated. Early season work centered around Pierce. Some of the eight units were later moved to the Silver and upper Beaver Creek drainages.

The bulk of work done by the four units employed on the Potlatch Timber Protective Association was confined to stream type Ribes. However, complete Ribes eradication was done in and around the two infection centers (Three Bear Creek and the junction of Elk and Deep creeks) known to exist prior to this season.

On the upper St. Maries River the rust was known to be generally present before work was started. For this reason it was necessary to work over both upland and stream types. Two units were employed.

Both upland and stream types were covered by the two units employed on the North Fork of East River on the Priest Lake Timber Protective Association. Ribes petiolare does not exist on this area in any quantities. Hence the work was confined to hand pulling with the exception

of a small area having heavy R. inerme where experimental spraying and respraying was done by the methods project.

One unit was engaged on Mount Rainier National Park. About one month was required to complete the area near Longmire Springs where work was started in 1930. The unit was then moved to the White River-Sunrise Ridge area in the northeast corner of the park, where it remained for the balance of the season.

Results of work are as follows:

RESULTS OF RIBES ERADICATION ON THE CLEARWATER NATIONAL FOREST, 1931

Hand Pulling

Unit No.	Acres Worked	Man Days	No. Ribes Pulled	Data Per Acre	
				Man Days	Ribes
*1	3,671	3,774	1,579,250	1.02	430
2	3,589	3,514	1,125,275	.98	314
3	3,592	2,076	1,209,751	.58	337
4	1,210	1,719	325,717	1.42	270
5	3,278	4,058	1,218,788	1.24	372
Totals & Averages	15,340	15,141	5,458,781	.99	356

Spraying

Unit No.	Acres Worked	Man Days	No. Gallons Spray	Data Per Acre	
				Man Days	Gallons
*1	514	352	7,817	.68	15
2	1,320	1,014	27,569	.77	21
3	169	483	11,592	2.86	69
4	196	605	16,909	3.09	86
5	286	635	14,266	2.22	50
Totals & Averages	2,485	3,089	78,153	1.24	31

*These five units represent 19 camps.

White Pine Acreage on Clearwater National Forest Ribes Eradication Areas, 1931

Unit No.	Acres Protected	Acres In Unfinished Areas	Total Acres	Requirements to Complete Protection		
				Acres to Work	Man Days	Gallons of Spray
1	11,000	4,317	15,317	2,315	2,418	2,150
2	12,465	5,660	18,125	940	1,555	11,700
3	3,592	3,318	6,920	3,318	2,600	2,500
4	5,700	3,230	8,930	2,010	2,275	15,080
5	22,740	1,160	23,900	810	980	700
Totals	55,497	17,685	73,192	9,393	9,828	32,130

RESULTS OF RIBES ERADICATION, CLEARWATER TIMBER PROTECTIVE ASSOCIATION, 1931

Hand Pulling

Camp No.	Acres Worked	Man Days	No. Ribes Pulled	Data Per Acre	
				Man Days	Ribes
1	1,411	659	205,092	.47	145
2	1,120	739	174,015	.66	155
3	938	628	224,695	.68	240
4	715	550	172,845	.77	242
5	723	594	227,397	.82	315
6	576	605	189,663	1.05	329
7	1,120	581	131,938	.50	118
8	587	367	91,663	.63	156
All	7,190	4,703	1,417,308	.65	197

Spraying

Camp No.	Acres Worked	Man Days	Gallons Spray	Data Per Acre	
				Man Days	Gals. Spray
1	183.3	290.0	5,403	1.54	29
2	289.3	162.9	5,033	.56	17
3	328.0	386.5	10,644	1.18	32
4	164.7	245.7	4,928	1.49	30
5	288.1	423.5	12,701	1.47	44
6	108.1	370.5	12,083	3.43	112
7	127.7	167.5	2,911	1.31	23
8	92.4	385.8	11,316	4.18	123
All	1,586.6	2,432.4	65,019	1.53	41

There remain about 538 man day's work on the stream type represented here upon completion of which, about 55,000 acres will have been given partial protection.

RESULTS OF RIBES ERADICATION, PRIEST LAKE TIMBER PROTECTIVE ASSOCIATION, 1931

Eradication Type	Acres Worked	Man Days	No. Ribes Pulled	Data Per Acre	
				Man Days	Ribes
Dense Mature	1,959	98.6	39,155	.05	20
Open Mature	6,379	937.4	639,911	.15	100
Dense Rep.	1,843	95.0	13,973	.05	8
Open Rep.	740	38.4	6,531	.05	9
Stream	1,166	691.8	327,726	.59	281
Dense Pole	37	3.0	677	.08	18
Open Pole	442	30.2	4,732	.07	11
All	12,571	1,892.4	1,032,495	.15	82

RESULTS OF RIBES ERADICATION UPPER ST. MARIES DRAINAGE 1931

Hand Pulling

Camp No.	Acres Worked	Man Days	No. Ribes Pulled	Data Per Acre	
				Man Days	Ribes
1	1,235	698.5	209,660	.57	170
2	779	779.0	200,223	1.00	257
Both	2,014	1,477.5	409,883	.73	204

Spraying

Camp No.	Acres Worked	Man Days	No. Gals. Spray	Data Per Acre	
				Man Days	Gals. Spray
1	284	652	19,167	2.29	67
2	196	455	14,800	2.32	75
Both	480	1,107	33,967	2.31	71

There remains about 250 man days work to do upon the completion of which about 5,830 acres will have been protected. The acreage not shown above had so few Ribes that working it was deemed not necessary.

#Wherever R. petiolare is found there are almost invariably bushes of other Ribes species associated with it. These must be hand pulled. Hence the acreage sprayed is always a portion of that hand pulled and when a summary of hand pulling and spraying data is made, the two acreages must not be added. Use only that shown under hand pulling.

RESULTS RIBES ERADICATION, POTLATCH TIMBER PROTECTIVE ASSOCIATION, 1931

Hand Pulling

Camp No.	Acres Worked	Man Days	No. Ribes Pulled	Data Per Acre	
				Man Days	Ribes
1	1,022	589	102,514	.58	100
2	1,379	850	203,464	.62	148
3	1,658	1,027	353,680	.62	213
4	677	924	370,221	1.36	562
All	4,736	3,390	1,029,879	.72	218

Spraying

Camp No.	Acres Worked	Man Days	Gallons Spray	Data Per Acre	
				Man Days	Gallons
1	138	189.0	3,145	1.37	23
2	8	22.5	700	2.81	88
4	13	19.0	461	1.46	35
All	159	230.5	4,306	1.45	27

In addition to the upland areas near infection centers which were worked, the stream type work done gave partial protection to about 33,000 acres of white pine lands.

RESULTS OF RIBES ERADICATION, MOUNT RAINIER NATIONAL PARK, 1931

Area	Acres Worked	Man Days	Ribes Pulled	Data Per Acre	
				Man Days	Ribes
Longmire	311.5	550	68,106	1.77	219
White River	958.5	799	204,504	.83	213
Both	1,270.0	1,349	272,610	1.06	215

In addition to the acreage worked on the White River area, over 1,400 acres containing white pine of importance from the same standpoint were worked by experienced scouts. About 800 acres of this had no Ribes and the balance, which lay principally in an open park, had a few Ribes which were removed. The protection zone around the area worked by scouts and crews had little pine and practically no Ribes.

Note: All tables subject to minor corrections following final checking of report.

EXPERIMENTAL RIBES ERADICATION, LASSEN NATIONAL FOREST, CALIF.

W. V. Benedict

From June until the middle of September of the field season just past, 35 sturdy sons of California clambered over the Deer Creek lava country leaving in their wake miles of white twine and thousands of dead and mortally wounded Ribes. Regardless of a flanking attack from nine forest fires and forty-nine rattlesnakes the California contingent exterminated 340,005 Ribes of various breeds from 17,340 acres of the Lassen Forest's choice sugar pine land. The following tabulation summarizes, according to eradication type, the results of the season's accomplishments:

SUMMARY OF RIBES ERADICATION

Erad. Type	Acres	Man Days	Ribes Eradicated					Ave. Per Acre	Acres Per Man Day
			R. roezli	R. nev.	R. iner.	R. cer. R. vis.	Total Ribes		
Stream	338	636.3	21,099	62,445	52,577	38	136,159	402.8	0.5
SP-F	4,263	785.1	113,190	25,725	339	2,254	141,508	33.3	5.4
SP-YP	3,007	419.2	47,975	5,195	172	649	53,991	18.0	7.2
Minor Types	383	58.9	6,188	326	1,717	116	8,347	21.8	6.5
Sub-total	7,991	1,899.5	188,452	93,691	54,805	3,057	340,005	42.5	4.2
Blocked out (SP-F 4393) (SP-YP 4704) (Minor 145) (Brush 107)	9,349	34.0							275.0
Type Total	17,340	1,933.5	188,452	93,691	54,805	3,057	340,005	19.6	8.96

The area worked this season contained fewer Ribes than any area thus far encountered in California. This condition is typical of much of the sugar

pine type on the Lassen Forest and appears to be characteristic of the lava formations so common in the northern Sierra.

All work done this year had to conform to an efficiency limitation of not to exceed 50 feet of Ribes live stem per acre. To attain this degree of efficiency frequently two, and occasionally three workings of an area were required. This was especially true in stream type and brushy areas. Fifty-four per cent of the eradication area supported less than 50 feet of live stem per acre and was eliminated from crew work.

Ribes inerme concentrations were encountered of sufficient density and magnitude as to preclude ordinary hand-pulling methods. As an entirely experimental undertaking, Diesel oil was employed as a spray to stems, leaves and crowns of sixteen acres of the heaviest R. inerme. Each bush was given a heavy dose of oil, including a healthy application to the soil at the base of the crown. A check-up on the work later in the season showed that although a high percentage of live stem was killed as a result of the oil application, the percentage of bush kill was low. Sprouting from the crown was abundant. Re-spraying was done on half of the area, oil being applied in copious quantities to crowns and surrounding soil.

Diesel oil was also applied to heavy concentrations of R. roezli with more encouraging results. No sprouting was noted on this species at the close of the field season.

Costs for this year's work have not as yet been computed. However, the costs will be the lowest yet attained in California. While some refinements in methods have of course been made, the season's low cost is largely the result of easier working conditions and fewer Ribes.

THE FOREST SERVICE PLANTATION AT SWIM, OREGON

B. A. Anderson

The Ribes eradication season at Swim, Oregon, started on July 12; a late start but the boys made up for it on the other end of the season. Turkeys were packed on October 20 - two months and five days before Christmas - the latest date at which an eradication camp has been held open on the western front. Onstat, who was in charge of the eradication camp, says you can't find Ribes in four inches of snow.

During the period 1913 to 1919 approximately 900 acres of burned-over land on Still Creek was planted to western white pine by the Forest Service. These plantings represent the largest single Forest Service plantation of western white pine in Oregon.

Because of the scattered locations of the plantings it has been necessary to eradicate the Ribes from almost 3,000 acres to adequately protect the plantation. The pine is in a healthy, thrifty condition and is making an average annual height growth of from 18 to 24 inches. On the

lower slopes the planted pine is supplemented by a fair stand of native white pine reproduction.

The Ribes species on the area consist of Ribes lacustre and R. bracteosum in the stream type, and R. sanguineum and R. viscosissimum on the slopes. An occasional bush of R. triste was also found in the bottomlands. Ribes were found in practically every seepage on the area. Ribes eradication work was started in 1927 and continued by a small force during the seasons of 1928, 1929 and 1930. The piles of dead bushes in the stream type worked during these years bear mute witness to some of the difficulties which had confronted Goodding on this particular project in his "Kingdom by the Sea."

In 1931, it was decided to place a large crew on the job to recheck the areas worked in past years and to extend eradication boundaries to a distance which it is believed will give adequate protection to the pine plantation.

The bad actors on the Swim project are R. lacustre and R. bracteosum. On part of the stream type they occur in such dense masses that it is almost an impossibility to hand pull them. In physical characteristics and habitat R. bracteosum closely resembles R. petiolare. On several of the areas where these species occurred in extremely heavy masses, they were sprayed with a 17 per cent concentration of Atlacide. Experiments with similar types of sprays applied to the leaves, stems, and crowns of this species have not been attended with very satisfactory results in the past. However, it was thought that a heavy ground application of the Atlacide spray about the roots of the plants in addition to covering the aerial portions of the plant might produce favorable results.

An inspection of sprayed R. bracteosum bushes this fall does not give much hope that a satisfactory kill will be secured. Parts of the aerial portions of the bushes seem to be dying back and show the same black streaks in the cambium layer which sprayed R. petiolare exhibits when the chemical is taking effect. The root systems do not appear to be affected in the least.

SUMMARY OF RIBES ERADICATION, 1931

HAND PULLING

Acres	Man Days	R. lac.	R. brac.	R. triste	R. sang.	Total	Ribes Per Acre
536.4	735.25	132,632	6,501	1,775	82	140,990	262.9

SPRAYING

Man Days	Acres	Gallons Spray Used	Gallons Per Acre
260	116.8	11,217	96.03

The Still Creek area is in very good shape at the present time but will probably require the following work during the 1932 season:

1. Hand pull Ribes from areas on which R. bracteosum and R. lacustre were sprayed, as the kill secured is problematical.

2. Check over all sites on which heavy concentrations of Ribes were found during the 1931 season, as there will probably be some missed bushes and sprouts appearing from overlooked or broken crowns.

In addition to the above necessary work, the following small areas need to be cleaned up:

1. Approximately 3 acres at head of creek Y.
2. Approximately 16 acres on creek #11.
3. The upland type between creeks #1 and #3 on which are found up to 30 R. lacustre bushes to the acre.
4. Upland type between creeks #4 and #5 on which are found up to 40 R. lacustre and R. sanguineum bushes to the acre.

After this work has been done it is my belief that the area would be on what could be called a maintenance basis. A small number of man days spent on rechecking the area each following year should be sufficient to keep the Still Creek plantation in a disease-free condition.

SOME OBSERVATIONS IN SOUTHEASTERN BRITISH COLUMBIA

W. V. Benedict

It was the privilege of the writer, in company with C. C. Strong and L. E. Nelson of Spokane and J. L. Mielke of the Division of Forest Pathology, to spend several days in the white pine belt of eastern British Columbia. The purpose of the trip was to observe the general development of blister rust in a region similar to the Idaho pine belt and to learn of its behavior under controlled conditions from plot studies inaugurated by the Division of Forest Pathology.

White pine reproduction is abundant over large parts of southeastern British Columbia, in many places being the key tree in the stand. Blister rust appeared to be present wherever white pines occurred, in greater or lesser amounts depending upon the proximity of the cultivated English black currant (Ribes nigrum). Almost every settlement supported some black currant bushes and pines in the immediate vicinity were heavily infected, infection becoming lighter as the distance from the black currant center increased.

Of striking significance is the ability of the rust, under conditions comparable to those present in north Idaho, to destroy and damage pines where but a few scattered Ribes lacustre bushes are present in the forest. This situation was noted in a region in which black currants were absent and the only Ribes was a scattering of R. lacustre. This same conclusion is borne out by the damage study plots of the Division of Forest Pathology. Plots have been established in regions remote from black currant

plantings and where Ribes are either absent or but scattered through the stand. On the plots and in the surrounding country all Ribes have been removed except a known few at the center of the plots. These bushes (R. lacustre) were artificially inoculated with blister rust and the resulting infection to the surrounding pines carefully noted. The general story for each plot is the same. Infection of sufficient magnitude occurs on the pines, for a distance of at least 150 feet from the Ribes, to so damage them as to make their continued propagation under such conditions doubtful. In one instance, approximately 26 feet of R. lacustre live stem per acre was responsible for such pine damage.

White pines are becoming rather alarmingly infected with blister rust on areas that have fewer Ribes than many areas in the Inland Empire and California after a Ribes eradication has been performed. In other words, this big question looms up. Are present methods providing the requisite degree of protection? If what is taking place in British Columbia has been properly interpreted, more intensive Ribes eradication methods must be adopted. Fullest consideration must be given to the danger involved in leaving even one Ribes per acre. Control costs that are already high for many localities must go yet higher before satisfactory control is achieved. Many things regarding the behavior of the rust are yet unknown. But, as the quest for additional knowledge continues, let cognizance be taken of the handwriting which at present seems to read: "More, much more intensive Ribes eradication."

THE LIBRARY

Anyone having books or pamphlets relating to forestry or pathology, or books of reference which would be of value to the office force, and wishing to place them in the library, will please turn them over to Miss Ryan, librarian.

NOTES

W. G. Guernsey returned October 30 from a month's business trip through the eastern states. While there he inspected infection and control conditions in the New England states.

* * *

H. E. Swanson left November 6 on a business trip to Washington, D. C. He plans on being gone about three months.

* * *

C. C. Strong, J. L. Mielke, W. V. Benedict and L. E. Nelson made a trip to eastern British Columbia October 30 to November 5 to inspect blister rust conditions there.

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December, 1931

W E S T E R N B L I S T E R R U S T

N E W S L E T T E R

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Confidential

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U. S. Department of Agriculture
Bureau of Plant Industry
Western Office Division of Blister Rust Control
Spokane, Washington

VIEWPOINTS ON THE EFFECTIVENESS OF CONTROL IN THE EAST

H. N. Putnam

I heartily agree with most of Guernsey's thoughts as expressed in his well written article, "Are Blister Rust Control Plans and Ribes Eradication Methods Adequate to Meet the Blister Rust Situation in the West?" However, on one point my reactions to a trip through New England are quite the opposite to Bill's, after he had made a similar trip.

Guernsey's feelings are shown by the following extracts from his article: ".....The presence of the rust is so impressed on one's mind from continual inspection of infected trees that it is rather hard to keep from having a pessimistic viewpoint...." And again: "....Throughout all these regions one is forcibly reminded of the havoc caused by blister rust." That his despondency was slightly lifted is shown by the following quotation with reference to the Yale School of Forestry near Keene, New Hampshire: "...These pine areas have been protected by pulling the Ribes and practically no rust is visible in the stand. This area gave me a better feeling as the picture to date had been somewhat gloomy."

My feeling after taking that nationally known trip through New England was one of optimism. True, I was taken to the Waterford, Vermont area, the Littleton, New Hampshire area and other well known strongholds of Cronartium ribicola. But, Bill, think of the significance of the fact that these strongholds are so relatively few and so well known. The reason they are so well known is that they are few in number, and the reason they are so few in number is that the blister rust forces have done and are doing their work so thoroughly and comprehensively that poor old blister rust hasn't anywhere to go, but must be content with wrecking vengeance on what few pines he had in his possession before control work got well started.

New England presents a very cheerful picture of the effectiveness of large scale control. Imagine what the picture would look like if no blister rust control work had ever been done in New England. Instead of driving miles and miles to see a few small areas of pines dead and dying from blister rust, we would be taken miles and miles to see a few stands free from blister rust because they were naturally free from Ribes. En route to these healthy stands we would be driving through enlarged replicas of the Waterford area, instead of, as at present, healthy, well stocked stands of young pine.

Blame for this deplorable reaction of Bill's to his trip through the beautiful pine covered hills of New England must be laid somewhere. I am inclined to fix upon the eastern control workers themselves a large measure of responsibility for Guernsey's unfortunate mental condition. Either through a sense of modesty or a failure to understand the state of mind of their visitors from the West, the eastern tour conductors fail to

emphasize the fact that due to their own effective efforts there are millions of acres of healthy white pines instead of millions of acres of dead and dying white pines.

It is as if you were trying to sell your house and you pointed out to your prospect that there was no fireplace, that the house was old, and that it needed repainting, instead of enthusiastically convincing him of the opportunity to own such a wonderful home for only $4,000.

I think it is incumbent upon the western visitor to see in New England a very encouraging demonstration of the effectiveness of large scale control, and it is the duty of the eastern host to see to it that his visitor has that viewpoint.

TO A BLISTER RUSTER RETURNING HOME IN THE FALL

"Who's the stranger, mother dear?
Look! He knows us! Ain't he queer?"
"Hush, my own! Don't talk so wild,
That's your father, dearest child!"
"He's my father? No such thing!
Daddy died, you know, last spring!"
"Father didn't die, you chump!
Father's been out in the stumps.
But the field season's over, so he
Has no place to go, you see!
No place left for him to roam,
That is why he's coming home.
Kiss him. He won't bite you, child,
All these Blister Rust guys look wild!"

From a poem (with slight changes) taken from the California Ranger, the weekly News Letter of Region 5.....G.A.R.

SUMMARY OF RECONNAISSANCE ON THE NATIONAL FORESTS OF CALIFORNIA

T. H. Harris

From 1926 through the past season 520,672 acres have been covered by intensive reconnaissance at a total cost of $17,577. Some of the finest stands of sugar pine in the central and northern Sierra Nevada and other mountains of northern California are included in this acreage.

In its present status reconnaissance has completed approximately two-thirds of the work to be done in California. The important forests remaining are the Sierra and Sequoia in the southern Sierra Nevada and the Trinity in the Coast Range. The Shasta, Tahoe and California contain some sugar pine.

TABLE NO. 1

SUMMARY OF RECONNAISSANCE ON THE NATIONAL FORESTS OF CALIFORNIA, 1926-1931

Types	Stanislaus			Plumas		Lassen		Eldorado		Klamath		Acreage of All Forests
	Acreage 1926	Acreage 1927	Ribes Per Acre 1927	Acres	Ribes Per Acre	Acres	Ribes Per Acre	Acres	Ribes Per Acre	Acres	Ribes Per A.	
SP-YP	1,140	42,652	14.5	51,027	20.2	48,876	13.3	37,493	35.9	26,599	30.4	207,787
SP-YP CO	1,176	4,572	44.2	6,771	15.5	3,702	15.4	399	5.4	6,336	62.8	22,956
SP-F	4,640	23,402	37.7	34,832	78.5	45,309	25.2	44,378	143.6	24,340	100.7	176,901
SP-F CO	892	480	51.5	1,911	33.4	3,529	11.9	283	12.4	732	195.9	7,827
Stream	189	1,100	109.8	1,916	193.5	844	179.3	5,399	217.6	2,540	653.8	11,988
Stream CO	17	33	109.0	107	239.6	-	-	-	-	574	648.8	731
Brush	1,176	3,236	11.9	2,936	34.5	7,103	15.1	6,477	85.9	4,212	84.7	25,190
Meadow	210	771	11.0	1,653	27.7	1,218	30.0	247	29.8	-	-	4,109
Non-SP	-	-	-	1,645	45.1	7,346	17.5	28,006	94.7	23,779	113.2	60,776
Non SP CO	-	-	-	-	-	-	-	-	-	2,357	79.5	2,357
Tot.or Ave.	9,440	76,346	25.0	102,808	43.7	117,927	38.8	122,682	96.6	91,469	99.4	*520,672

* 198,684 acres additional have been covered by extensive reconnaissance.

TABLE NO. 2

COST OF RECONNAISSANCE

National Forest	Cost	
	Per Acre**	Total #
Stanislaus 1926	$ .098	$ 930.25
Stanislaus 1927	.028	2,333.55
Plumas	.030	3,264.78
Lassen	.029	3,416.22
Eldorado	.032	3,956.07
Klamath	.040	3,676.58
Tot. or Averages	$ .034	$17,577.45

** Intensive reconnaissance only.

All reconnaissance work intensive and extensive.

TABLE NO. 3

RIBES SPECIES ENCOUNTERED BY RECONNAISSANCE

Stanislaus	Plumas	Lassen	Eldorado	Klamath
R. roezli	R. roezli	R. roezli	R. roezli	R. cruentum
R. nevadense*	R. nevadense*	R. nevadense*	R. nevadense*	R. sanguineum
	R. inerme*	R. inerme*	R. viscosissimum	R. klamathense*
	R. viscosissimum	R. viscosissimum	R. cereum	R. viscosissimum
	R. cereum	R. cereum		R. lobbii
				R. lacustre*
				R. bracteosum*
				R. binominatum
				R. marshallii

*Predominantly stream type species.

SUMMARY OF RECONNAISSANCE ON THE KLAMATH NATIONAL FOREST
CALIFORNIA, 1931
T. H. Harris

The Ribes population of the 91,469 acres of the Klamath Forest covered by reconnaissance is estimated to be in the vicinity of nine million bushes. This trifling figure is divided among nine species inhabiting five major eradication types.

TABLE NO. 1

RIBES ANALYSIS OF AREAS COVERED BY RECONNAISSANCE KLAMATH NATIONAL FOREST
CALIFORNIA, 1931

		Ribes Per Acre									
Erad. Type	Acres	R. sang.	R. lob.	R. cruent.	R. lac.	R. vis.	R. binom.	R. klam.	R. brac.	R. marsh.	All Spec.
SP-YP	26,599	2.9	14.6	10.1	.9	1.8	.1	-	-	-	30.4
SP-F	24,340	20.4	38.9	13.8	7.6	18.1	4.9	-	-	-	100.7
Non-SP	23,779	12.0	29.4	14.2	8.0	33.4	24.2	-	.02	6.0	113.2
Brush	3,247	25.8	13.9	16.5	8.1	9.2	3.5	-	-	-	77.0
Stream	2,540	48.0	30.5	28.8	503.5	2.7	7.7	2.5	29.9	.4	653.8
SP-YP CO	6,336	16.6	31.2	14.9	-	-	-	.16	-	-	62.8
SP-F CO	732	102.6	89.9	3.4	-	-	-	-	-	-	195.9
Non-SP CO	2,357	45.7	25.1	5.2	.9	2.6	-	-	-	-	79.5
Brush CO*	965	55.0	65.4	-	-	8.1	-	-	-	-	128.5
Stream CO	574	97.5	41.8	4.9	479.9	-	-	24.7	-	-	648.8
All Types	91,469	17.5	27.3	12.9	21.7	9.4	8.0	.2	.8	1.6	99.4

*Originally was SP-YP or SP-F, since logging these areas have returned to brush, 10% restocked with reproduction.

TABLE NO. 2

SUMMARY OF RIBES POPULATION

Erad. Type	Acres		Bushes	
	No.	% of Total	No.	% of Total
SP-YP	26,599	29.1	809,632	9.0
SP-F	24,340	26.6	2,448,146	27.0
Non-SP	23,779	26.0	2,686,863	29.7
Brush	3,247	3.5	235,904	2.6
Stream	2,540	2.8	1,660,597	18.3
SP-YP CO	6,336	6.9	397,607	4.4
SP-F CO	732	.8	143,403	1.6
Non-SP CO	2,357	2.6	184,839	2.0
Brush CO	965	1.1	120,866	1.3
Stream CO	574	.6	372,425	4.1
All Types	91,469	100.0	9,060,282	100.0

It is seen at once from the accompanying tables that in this northwestern corner of California the average number of bushes per acre is high. The lowest figure is 30.4 per acre in SP-YP (sugar pine-yellow pine), the next lowest is over twice the size of the first, or 62.8 per acre in SP-YP CO, while the highest is 653.8 per acre in stream type. The average number per acre of all species and for all types for the entire area covered is 99.4 bushes. Elk Creek, a unit for which the data were compiled separately, showed 1,040 bushes per acre in stream type, 804 of which were R. lacustre. These figures are the highest yet obtained for any sizable area in the sugar pine region of California.

However, not all of the Klamath shows such a high Ribes population. 21,030 acres in the Orleans district support only 17.6 bushes per acre. Here 454 acres of stream type have 154.4 R. bracteosum per acre out of 279.2 of all species. R. bracteosum is a large-leaved currant high in susceptibility.

The best pine producing lands on the Klamath have an average of 115.8 bushes per acre divided among eight species.

R. sanguineum, R. lobbii, and R. cruentum are the most widespread of all the species found. R. lacustre is confined to the stream type of the northern half of the forest; R. viscosissimum, R. binominatum and R. marshallii characterize the higher elevations, the last named species being extremely localized in its occurrence.

Stream type, which is 3.4 per cent of the total acreage, supports 22.4 per cent of the bushes. Non-SP types exclusive of brush composing 28.6 per cent of the area have 31.7 per cent of the Ribes. Much of these are fir types (Douglas fir, white fir, and Shasta fir) intermingled with and

occurring along the upper limits of the sugar pine types. They represent a difficult factor in any control program.

WHO HAS THESE PUBLICATIONS?

The following bulletins and books from the Division of Blister Rust Control library have been borrowed and not returned:

"The Western Pine Bark Beetle" (Dendroctonus brevicomis)

"A National Program of Forest Research" (Pub. by the American Tree Ass'n. for the Society of American Foresters)

"Forest Nursery and Planting Practice in Oregon"

"Forest Statistics and Maps Northern Rocky Mountain Dist., U.S.D.A. F.S. 1929"

STEPS IN A PROGRAM OF PROTECTION OF WHITE PINES AGAINST BLISTER RUST

H.N. Putnam

Wherever blister rust control is practiced, in the East, Lake States or West, there are three fundamental steps in furnishing blister rust protection to pine stands. These steps are:

1. Determination of the pine values at stake, their location, extent and characteristics, and general Ribes conditions.

2. Determination of the costs and methods of Ribes eradication from pine stands previously evaluated.

3. Protection of pine stands by the removal of Ribes thereon according to plans already made.

These general principles governing local control practices are well known. It is only in their application that methods of doing the work vary in different regions. It seems to me that the chief factor influencing the methods of applying these principles is the size of ownership or control of pine areas. It is a fairly well established generality that the larger a given unit of a job is, the more systematic and definite must each step in its solution be.

This principle is well illustrated in the work of furnishing blister rust protection to white pines. In the Inland Empire our cooperators are few in number and each one represents large white pine ownership. For example, in 1930 Ribes were eradicated from 14,104 acres of stream type representing partial protection on nearly a quarter million acres under the control of five cooperators, an average of approximately 2,821 acres per

cooperator. Correspondingly, it is in this region that each of the three steps culminating in protection to the pines is most systematically done and sharply defined. These three steps are known in the West as: (1) control reconnaissance, (2) pre-eradication survey, and (3) local control. Control reconnaissance, as defined in "Blister Rust Control Work in the Far West, 1928" is: "A rapid and systematic survey of the white pine region to determine; (1) the extent and distribution of white pine types, and (2) the factors influencing the cost and methods of eradicating Ribes thereon."

The pre-eradication survey is defined in this same report as: "To obtain such information on the area as is necessary for planning the field organization and method of procedure..." At the present time the scope of pre-eradication has been enlarged to include the estimated cost of control which can then be weighed by the owner against the value of the pines to be protected. The third step, the actual protection of pines by the removal of Ribes from the stands, of course, needs no definition here.

In the West the pre-eradication surveys are, wherever possible, made by men who will supervise the actual Ribes eradication work the following season. Control reconnaissance is usually performed by men who will have no direct connection with subsequent protection work on the areas reconnaissanced.

At the small end of the scale of size of ownership of our cooperators comes the work done in New England and New York. Here in 1930 153,368 acres owned by 2,409 individual cooperators were cleared of Ribes, an average of approximately 64 acres per cooperator. In this region, the three steps in furnishing protection to pine stands, while present, are not distinct or considered separately. Usually the first and second steps are performed at one time when the prospective cooperator is interviewed. The agent sizes up the job, informs the owner and arranges for the cooperative control at a satisfactory time. The Ribes eradication work is then performed by the owners' labor supervised by a state foreman. Often the entire three steps are performed in one operation. The methods of getting individual cooperation vary widely in the East, but the basis is the judgment of the agent, or his representative, rather than quantitative data based on surveys as in the West.

Where local control is secured on the basis of town cooperation, as I saw it functioning in New Hampshire, the general methods used approach those in the West. In New Hampshire the land in a cooperative town is gone over by a scout, who maps in pine areas, indicates portions requiring crew work, and scouts the remaining portions for Ribes.

In the Lake States, owing to the wide range in sizes of ownership, we must use methods in vogue both in the East and West. In Minnesota, Wisconsin and Michigan there is an approximate total of 57,000,000 acres of permanent forest land, a large amount of which once supported the finest stands of Pinus strobus in the World. Approximately 75 per cent of this acreage is in large ownership, and 25 per cent in small ownership, that is, in farmers' wood lots. In the latter class our cooperative control resembles

that in the East. As to the land in large ownership, we are using methods similar to those in the West. We have already performed the first two steps on two national forests, and are hoping to perform the indicated Ribes eradication next spring. We are making every effort to complete the first step, that is, to obtain information on the location and extent of all white pine areas and planting sites in the Lake States, as soon as possible. This is essential to the development of an intelligent and systematic control program.

In the foregoing article there is no intention of criticizing the program of protecting pines against blister rust in any region. On the contrary, I believe an unbiased observer would conclude that mature judgment and intelligence are shown in the methods of attacking the problem throughout the pine growing regions. This paper is simply an attempt to show that fundamentally the general procedure in protecting pines against blister rust is the same everywhere, but that methods vary, dependent chiefly upon the size of white pine ownership. In furnishing protection against blister rust we must know: (1) the location and extent of white pine areas, (2) make plans for their protection, and (3) protect them.

CLEARING UP THE CLEANING PROBLEM

It has recently been necessary in numerous instances to make suspensions from expense accounts on claims for reimbursement which have been entered in the body of the accounts and on the supporting subvouchers merely as "cleaning and pressing." In making such suspensions we have stated that specific information is necessary as to the articles of clothing cleaned or pressed in each case in order that we may determine if the articles of clothing in question come within the decision by the Comptroller General as to articles of clothing for which reimbursement for cleaning and pressing may properly be made. A synopsis of this decision by the Comptroller was published in the Blister Rust News for the month of January, 1931. However, it seems advisable to publish the complete decision at this time for the general information of the western blister rust personnel.

"SUBSISTENCE EXPENSES--HAT CLEANING

> "The provisions of paragraph 58 of the Standardized Government Travel Regulations which provide for the cleaning and pressing of clothes of employees while in a travel status, do not authorize reimbursement of the expense of cleaning the traveler's hat.

"Decision by Comptroller General McCarl, July 1, 1930:

"There is before this office for consideration and settlement the claim of C. M. Aldous, an employee of the Bureau of Biological Survey, Department of Agriculture, for reimbursement of expenses in the sum of $1.50 incurred at Rosewell, N. Mexico, January 14, 1930, for cleaning one hat, a part of

his wearing apparel. The claimant's travel order at the time provided for actual expenses not to exceed $7 a day while absent from Albuquerque, New Mexico, his official headquarters.

"The Standardized Government Travel Regulations, as amended effective March 1, 1929, provide:

"58. Laundry and cleaning and pressing of clothes.--Laundry, not to exceed an average of $1.40 per week, and cleaning and pressing of clothes, not to exceed an average of $1.25 per week, with proportionate amounts for fractional parts of a week;*** (See note)

"While the travel regulations for many years have contained provisions for cleaning and pressing clothes, it has never been the practice to regard such provisions as including the cleaning of hats. The term 'cleaning and pressing' is to be taken conjunctively as indicating what is meant by 'clothes' and must be regarded as limiting the term to such items of wearing apparel as are ordinarily pressed or cleaned and pressed at frequent intervals, the reason for considering such items as a part of reimbursable travel expenses presumably being either that such cleaning and pressing are done without expense when not in a travel status, or that the conditions of travel necessarily require that the pressing or cleaning and pressing be done at more frequent intervals. Such presumptions do not ordinarily arise with respect to the cleaning of hats; but be that as it may, it must be held that the term 'clothes' as used in the provision in paragraph 58 of the Standardized Government Travel Regulations relative to cleaning and pressing clothes was intended to have only that restricted application which had been given to the term by administrative and accounting officers over a long period of years in constructing former travel regulations containing a similar provision. The claim must be and is disallowed." (A-32036 10 Comp. Gen. 9)

Note - Since the above decision was rendered the Travel Regulations have been amended. Paragraph 58 now provides for reimbursement for "laundry and cleaning and pressing of clothes not to exceed an average of $3.00 per week with proportionate amounts for fractional parts of a week. * * * * * "

Leave on Saturdays: - The Official Record of March 14, 1931 carried an amendment to paragraph 494 of the Administrative Regulations of the Department of Agriculture with regard to leave taken on Saturdays. This paragraph now reads as follows:

"494 - Saturdays will be charged as four hours in annual leave and as a whole day in sick leave and leave without pay."

HAND PUMPS

J. F. Breakey

Back at the beginning of the chemical eradication of Ribes studies, a hand pump was determined to be the most efficient instrument for the

distribution of sprays. Other apparatus that appeared as contenders for a place as spray spreaders were, pressure tanks with single chamber, pressure tanks with double chambers, high pressure cylinder (2200#) furnishing pressure to low pressure tank, hydraulic pumps with separate air chamber, and various designs of hydraulic pumps, the operation of the latter resembling that of a "trombone".

As each type of spray spreader was tried and checked, the hand pump became a gauge by which others were measured. Later a study was started to try and eliminate all undesirable kinds of hand pumps which necessitated several trials of each type of pump. This study was first confined to manufacturers and their pumps but has of late been applied to individual parts, the ultimate objective being a pump that will give 100 per cent service all of the spraying time.

The best material for pump construction, three special designs for hand pumps, their repair and maintenance in the field, and accessories necessary for their satisfactory performance have been featured parts of the equipment perfection and maintenance program. It has been possible to study the effect of severe field treatment to all pumps and make changes with a resultant reduction of delays for the isolated men on the spraying jobs.

The United States Forest Service in this region has for the past two years shown an ever-growing interest in hand pumps as a valuable aid in "mopping up" fired areas, "wetting down" fire trails, quenching fire on burning snags without felling same, and backfiring with kerosene (burning wick attached at nozzle of pump). For the past two years we have combined with the Forest Service purchase orders to secure a better price per pump, and to persuade the factory to make changes on their stock pumps at time of manufacture instead of having to make such changes in a local repair shop prior to being sent into the field.

There is some indication that the hand pump may become still more firmly established. Stock pumps put up by factories for dual purpose (high pressure and large volume) performance are not proving adequate for the work required of them. Some experimental units indicate that where spraying is to be done a high pressure, small volume pump is much more desirable than the dual purpose pump. As an aid to fire fighting a hand pump must project a much greater quantity of liquid to attain the height required for quenching burning snags. Here again the dual purpose pump is not adequate, as such a pump must be capable of a greater output than that furnished by any dual model. By specializing in two distinct types of hand pumps much more efficiency per unit may be obtained.

MAYBE HE WAS A SAILOR?

Anonymous

Last fall when Goodding was scouting for blister rust in southwestern Oregon he had an occasion to ride a horse into the back country. The round trip was made and everything was going well until our estimable

state leader from Oregon got too close to the horse's heels. The horse immediately became playful, raised both hind feet and placed them squarely against Goodding. The results were as follows: (1) a nice three-point landing for Goodding in a brush patch twenty feet removed; (2) a pair of torn trousers; (3) blue air, and (4) an enraged state leader.

Very little was said concerning the incident but one day while Goodding was in swimming a little boy was heard to remark, "Oh, Daddy, look at the sailor with a horseshoe tattoed on his hip."

FORESTRY IN THE STATE PENITENTIARY

G. A. Root

According to the California Ranger, edited in R-5, "Assistant Regional Forester Hutchinson gave an illustrated forestry lecture before 200 men at San Quentin State Prison last Sunday. There are about 75 men at San Quentin who are studying forestry".

Might be a chance here to spread a little blister rust doctrine.

NOTES

S. N. Wyckoff left Spokane December 7 on a two weeks' business trip to California.

* * *

Miller Cowling returned to the office November 27 after spending five weeks at Crissy Field, San Francisco obtaining data on aerial mosaic map making.

* * *

C. M. Chapman returned December 1 from Ogden, Utah where he was stationed on plant quarantine inspection work.

* * *

Here's wishing everyone all the happiness of the season, a Merry Christmas and a Happy New Year.